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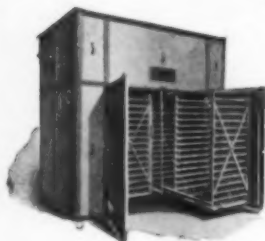
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CHEMICAL & METALLURGICAL ENGINEERING

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Ahead in Technique, But Laggard in Science

SUMMARIZING his impressions of one American industry in contrast with the like British business, an eminent British chemical engineer recently said, "You are far ahead of us in mechanical technique, but we have outstripped you in the applications of science and chemistry."

It would not be fair, either to the American industry or to our distinguished visitor, to name the particular business to which he referred; but we are inclined to believe that quite a number of American chemical activities would, if they were carefully to investigate their position, find this comment applicable to their affairs. Labor has been expensive, but raw material relatively cheap and the markets not very exacting. The consequence has been great emphasis upon the mechanical handling of materials and upon the development of most efficient labor-saving devices at every stage of industrial processing; but industrial research has not kept pace with this mechanical advance.

In many of our industries active effort to find foreign markets is being made and must succeed in order to give full industrial success at home. Moreover, some of the foreign producers, regaining their pre-war activity without finding satisfactory markets at home, are even entering the United States in competition with domestic producers. It therefore behooves every American manufacturer to give more than usual attention to the latest scientific development abroad.

Fortunately a good research staff is usually capable of doing this for any company by closely watching the technical and scientific literature of other countries as well as that in our own. Only the management which looks down upon catalysis, colloids, adsorption and other physical-chemical phenomena as "new-fangled facts" need worry about falling far behind in the race if adequate support is given to chemical fundamentals as well as to mechanical research.

Shaping the Future Of Petroleum Production

BY MAKING two barrels of gasoline grow where only one grew before, the cracking process has had a tremendous influence on the course of development in the petroleum industry. By greatly increasing the production of a marketable commodity, it has performed a definite economic service. But the cracking process has also introduced the element of flexibility into petroleum refining to an extent that may yet prove to be the industry's salvation.

A few years ago, when kerosene was the principal product of the refinery, gasoline was aptly called a

"liquid white elephant." Then the internal combustion engine turned the tables in the oil industry and as the demand for gasoline began to exceed the quantity available in the crude oil, it was necessary for the cracking process to come to the rescue. It changed an undesirable byproduct into a profitable commodity of commerce. Now still another change seems to be in prospect. With the growing recognition of the fact that for many domestic and industrial purposes, oil burning is more efficient and economical and certainly more convenient than the use of raw coal, fuel oil appears to be coming into its own right. This implies that on some not-distant day, gasoline will again be relegated to a position of secondary importance while fuel oil becomes the controlling product of the refinery.

Just as the cracking process helped to bridge over the change from kerosene to gasoline, so it can be depended upon to serve a similar function in further changing of refining practice. As the margin of profit narrows or shifts from one product to the other with changing market conditions, the refinery in possession of cracking equipment is able to direct its production along the line that yields the greater return. It is this element of flexibility that makes the cracking process a determining factor in shaping the future of the petroleum industry.

Government-Owned Patents May Be Licensed to Industry

IN AN OPINION transmitted to the Secretary of the Navy, Attorney-General Stone has recently declared that, with respect to government-owned patents, revocable licenses can lawfully be made to private industry by the heads of executive departments. He points out that such licenses have been granted in the past and that the custom has grown up without the interference of Congress, if not with its tacit consent.

The question was raised by the Secretary of the Navy because various companies had demanded the right to use certain inventions and because the department felt that it was undesirable for the government to hold exclusive rights in inventions except those which for obvious reasons should be kept secret. In developing his opinion, the Attorney-General points out that Congress alone has power to dispose of property belonging to the United States, and that in the absence of explicit action by Congress the Executive is without power in such cases. But he proceeds to draw a clear distinction between the disposal of property by transfer or lease and a non-exclusive revocable license under a patent. In the latter case there is no transfer of tangible property and the patentee still retains his monopoly. Quoting various cases, the Attorney-General says, "It has been uniformly held that revocable licenses, in the public interest, for the use of government property, could

be given by the head of the appropriate department. . . . There has been no prohibition by Congress, so far as I am informed, of the granting of licenses of the nature proposed. . . . So that it may be said that while the Constitution prohibits the alienation of the title, ownership or control of government property without Congressional sanction, Congress has given the head of a department authority and control over the 'use' and preservation of such property in his charge." In conclusion, the opinion is expressed that the Secretary of the Navy has the power to grant a proposed license, when the contract is modified in certain details suggested by the Attorney-General, who sees "no reason why such licenses may not be used in all cases when the conditions are analogous to those in the specific case submitted."

In the course of his argument the Attorney-General touches on the moot question of compulsory licensing by patentees who are either unable or unwilling to exploit their own inventions. "It may be argued that it is a duty of those having the charge of this property to make the most of that valuable right [licensing] by exercising it." And since the United States does not manufacture for sale under any of the patents it owns, it would in effect bury its inventions if it did not make them available to industry through non-exclusive and revocable licenses.

The opinion of the Attorney-General is clear-cut and settles any doubt that may have existed as to the right of the government to license to industry the patents which it owns or may acquire.

On Civilization's Battlefront

ADVANCE of civilization, even its maintenance, always implies a battlefront. Tradition, inertia, mental laziness, ultra-conservatism, near-sighted self-interest and a host of other enemies constantly oppose social advance. They must be fought." It was Dr. Vernon Kellogg, secretary of the National Research Council, who thus introduced a recent scientific gathering to his theme, "The New Battlefront of Civilization." The militant chord thus struck was echoed back and forth in subsequent discussion by leaders of national prominence in engineering, in chemistry, in psychology and in medicine.

The theme proved peculiarly appropriate, for it was the Great War that afforded us at once a revelation of the true value of science and a stimulus to its further extension. It was then we saw the cumulative effects of organized research, the incidence of many sciences directed toward a common goal. Organization, already an inseparable part of American genius for business achievement, thus found its place in scientific research. It was from the war that Dr. Kellogg drew the further lesson: In science we need geniuses to push forward, like the war's heroes, and to capture new positions in the enemy's stronghold. More important, we need the combined, organized effort of the greater number to bring up the battlefront, to fight for and hold securely the new positions captured in the van of scientific progress.

How, then, goes this battle along the different fronts of science?

The psychologist, Professor Thorndike of Columbia, reported that the science of human nature and behavior

is fast becoming the basal foundation for progress in economics, sociology, government and business. Man is on the way to obtaining the same command over himself that he has long exercised over the physical facts of the inanimate world.

The electrical engineer, according to Dr. Jewett of the Western Electric Co., is taking for his tools of tomorrow, today's discoveries of a J. J. Thomson, a Rutherford or a Millikan. In perhaps no other field have we seen such rapid adaptation and utilization of the fundamental discoveries of scientific research and investigation. And those who have carried forward the battlefront here have been guided always by a great utilitarian motive—adding to the comfort and progress of civilization.

In medicine, the intelligent fight that Dr. Francis Carter Wood himself has led against the ravages of the cancer is typical of a great organized opposition to the forces that threaten human existence. "The problem of the ultimate cause of cancer will be solved only with the completion of our knowledge concerning life itself" implies that the battle is but half begun.

Chemistry, judging from the delectable contribution of our own good friend Dr. Slosson, is ready to desert the ranks of murderous warfare and the grosser means of chemical invention, to use more subtle methods for controlling the course of civilization. The synthesis of foods and medicines, of vitamins, of even the hormones of the body that control the processes and attributes of life itself—these are some of the lines of attack that seem to hold most promise for the future.

Thus we find all—chemist, physician, engineer, psychologist—arrayed on the battlefront of civilization. All energies are concentrated in the outstanding struggle of science against ignorance, prejudice and empiricism.

Borax, Soft Soap and The Latest Burnham Venture

IN AUGUST last we openly criticized the Burnham Chemical Co. for its methods of selling stock, making particular reference to the *Lake of Treasure*—an eight-page newspaper that was being distributed in quantity far and wide, the expense of which we stigmatized as "a wanton waste of funds subscribed by investors for the promotion of a technical enterprise." Moreover, we questioned the soundness of the alleged technique by which potash and borax were said to be recoverable from the brine of Searles Lake, California; and we suggested that "The company's funds should be diverted from the production of newspapers and promotion literature to research and development along sound technical lines. Until that policy is adopted, and until reasonable prospects of success are assured," we concluded, "investors are well advised to scratch the Burnham Chemical Co. off their list."

Modesty prevents us from assuming to what extent our exposé has influenced a change of policy on the part of this concern, but we note that the November issue of the *Lake of Treasure* is termed a "Beauty and Household Edition," the venue, to borrow a legal term, having been changed from Reno, Nev., to San Francisco, Calif. Operations of what is termed the "Soap Department" of the company are now being conducted from the office in San Francisco of C. W. Whitney, one of the directors. A statement shows that incorporation was

effected in Nevada in March, 1921, and that the capitalization of the company was increased to \$10,000,000 in April, 1924! From among the stockholders, we learn, has been formed an "advisory board," consisting of "prominent engineers, attorneys, bankers, business men and others . . ." The point that interests us most, however, is the allegation that "on the technical staff alone, which forms a part of the advisory board, there are over fourteen prominent engineers. Practically all of these engineers are mentioned in 'Who's Who in Engineering,' and five of them are eminent consulting engineers." The names of these gentlemen, it is significant to note, are not divulged. Being in questionable company, they may prefer to remain in the background.

Technology, however, plays an insignificant part in the latest move on the part of the Burnham company, although facsimiles of patents are still being used with effect. The story of Searles Lake—the pioneer efforts of "Borax" Smith and others—is retold for the *n*th time, the account concluding with a short paragraph drawing attention to the holdings of the Burnham company and affirming that in recognition of Mr. Burnham's work in having "invented certain highly economical processes of recovering the mineral treasure from the brine of this subterranean deposit," and having confidence in his ability, "the government granted a lease on this huge deposit . . ." Various illustrations enliven the eight newspaper-size pages of printed matter. One pictures "Discovering the Underground Stratas [*sic*] and Rich Subterranean Brine at Searles Lake." Another purports to illustrate the washing of borax crystals on a vacuum filter, so that it will "come out pure"; our friends in the business of producing refined borax will, we feel sure, indulge in a wan smile at this stage. Another picture shows a small pile of what is alleged to be "Cinderella Borax," produced by the Burnham company. Skeptics who may wonder how it was obtained are advised to "Note the Automatic Conveyor in the Background."

The *Lake of Treasure* is written primarily to attract the attention of women, "because they are the managers of the Home and the thrifty advisers or custodians of the Family purse." It begins with a dissertation on the complexion, because "the one most obvious part of the human anatomy brought in contact with soap is the skin." Note the delicacy with which any reference to the body is avoided! Advice is given on the art of entertaining, the selection of dress colors and hats, social etiquette, and how to retain the charm of beauty and youth. Exigencies of space prevent more than a deflection of attention to the mass of twaddle that is being broadcast at the expense of the stockholders of the Burnham Chemical Co., but we are willing to give a wider publicity to a few typical gems:

"A woman with a short neck should wear a hat that does not come down very far in the back . . . Friends are folks willing to do things for us, to help us, to make life more enjoyable for us. The Burnham Chemical Co. hopes to be numbered among your friends . . . Do not lead anyone around the room like a circus horse in order to introduce her or him to the company present . . . Girl Hunt—This is particularly suitable for outdoors in the evening. Give each man a Chinese lantern and make him hunt for one of the women of the party who have hidden about the premises. Each lady thus hunted down becomes the

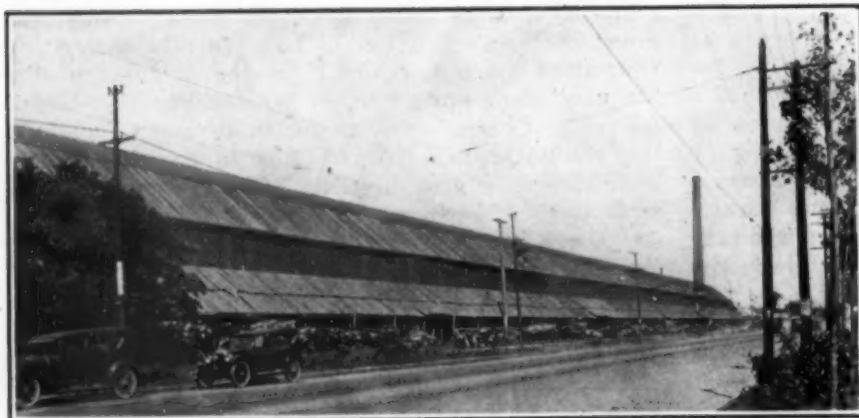
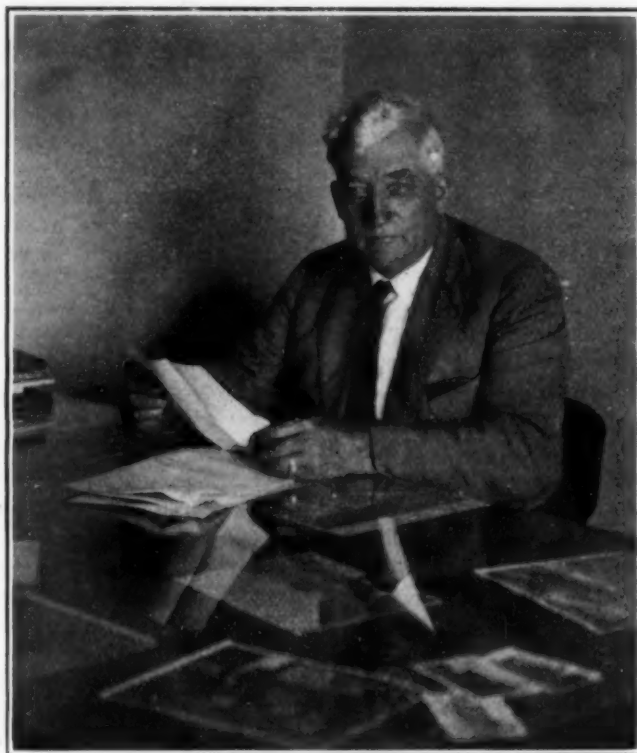
partner of the hunter for the occasion . . . The Cinderella Plan—from Maker Direct to User—is a Beacon Light on the Ocean of Commerce that saves money from being needlessly dashed against the rocks of useless cost . . ." and so on, *ad nauseam*.

The purpose of the new publicity campaign is to advertise the "Cinderella Family Soap Treasure Chest . . . \$30 worth of Soap for \$19.85." The evident inference to the readers of this sheet, which is mailed to 150,000 persons, is that the Burnham Chemical Co. is producing borax, as well as the other materials used in the manufacture of soap, at Searles Lake, and in quantity. It is affirmed that "The borax in our soap comes from the U. S. Mineral Reserve at Searles Lake, California . . ." This may be true, whether few or many of the so-called Burnham treasure chests are sold as a result of the appeal; the American Trona Corporation, which has a large plant in successful operation at Searles Lake, is one of the principal manufacturers of borax for domestic consumption in the United States. "The Burnham Chemical Co. holds a lease on this deposit," we read with reference to the government reserve, "and pays the government a royalty of 2 per cent on the borax produced." We should like to know to what extent the Treasury has benefited to date.

Another specious argument advanced is that the purchase of a "Cinderella" outfit will be an economical move on the part of the housewife. It is maintained that "By dealing direct with the maker (who goes direct to Nature's Treasure Lake for the materials) you avoid paying a profit to the middlemen—the Manufacturer's agent, the Wholesaler, the Retail Grocer." Charts serve to insinuate more forcefully that the Burnham company is able to manufacture and distribute on a gigantic scale. The present appeal is made to 150,000 persons, who are asked to spend nearly \$3,000,000 on household soap products. Acceptance of the offer will result, it is affirmed, in the saving of \$1,500,000. These statements infer the recent launching of an extensive manufacturing enterprise on the part of the Burnham Chemical Co. We have heard nothing of this through channels that can be depended upon to supply us with such information, and we doubt that the stockholders have been approached for an approval of such a plan.

We have two particular reasons for again drawing attention to the activities of Burnham and his associates: The methods of any concern that is registered as a chemical company is likely to come under our notice, to receive our wholehearted support or our disapproval. It is our duty to discourage questionable methods of promotion and the diversion of money received from stockholders to purposes other than those specified or inferred when the appeal is made. Furthermore, we have a proprietary interest in the technology and economics of the American soap industry and its reputation for clean merchandising methods. In our previous exposé of the Burnham company activities we drew attention to the immense amount of money that had been subscribed, by the skillful operation of a "sucker list," ostensibly to place the Burnham evaporation process at Searles Lake on a commercial basis. It is regrettable, to say the least, that these funds should be used to subsidize unfair competition with high-class soap manufacturers who market their products through the usual, legitimate channels.

**The Gas Man
Says, "Use Gas"—Maybe
He's Right**



ABOVE, Daniel Blaul, president of the Lake View Brick Co., had the courage to try out a refined fuel on a cheap product.

TO THE LEFT, an old-time brick yard, now equipped for gas firing. Note cordwood piled up as in former practice.

BELOW, gas-fired brick ready for delivery. Note the method of piling used in building the kiln from green brick.

At the top of the opposite page is a modern gas-fired brick kiln in action; 78,000 cu.ft. of gas is needed for 39,000 brick. The firing time (30 hours) is a little more than one-third that required by the old method with wood and coal, while the labor is cut 75 per cent.

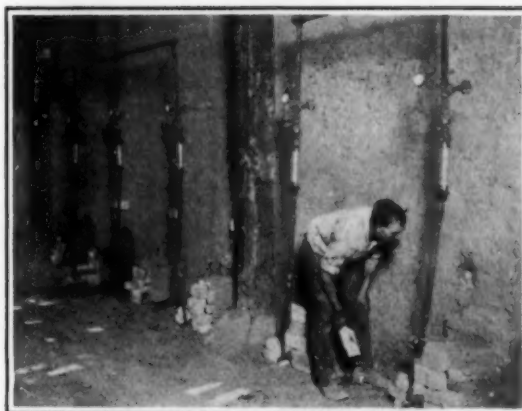


Exit the "Brick Yard"

And in Its Place, Enter the Brick Factory
With Up-to-Date Methods of Fuel Application

By Hugh H. Wikle

Industrial Engineer, Peoples Gas Co., Chicago, Ill.



THE application of city gas to the up-draft kilns of the Lake View Brick Co., of Chicago, Ill., marks the beginning of an epoch in the utilization of refined fuel in the ceramic industry. The brick manufactured by this company is a stiff mud brick made from the familiar Illinois clay. An analysis of this blue clay shows it to be rich in lime. For this reason the brick burns to a whitish color instead of to the ordinary red. The lime is in the clay as the gray-white carbonate which burns to the oxide and causes no trouble when the brick are burned (vitrified) hard enough. At one stage in the burning the brick are red due to the predominance of the color of the iron oxide over the gray of the unconverted carbonate. In the completely burned brick the whitish color of the calcium oxide predominates, however, so it is comparatively easy to sort out the under-burned brick. Analysis of the clay shows moisture, 2.36 per cent; volatile, 11.77; lime, 11.72; sulphur, 2.05; residue, 72.10.

The "stiff mud" process is used. The clay is conveyed from the clay pit near the factory to a Chambers brick machine. This is an auger-like apparatus that extrudes the clay through a die in two parallel streams. The width and thickness of these streams are the width and thickness of the green brick. The brick are wire-cut to the desired length and belt-conveyed to the drier, where sufficient moisture is removed to

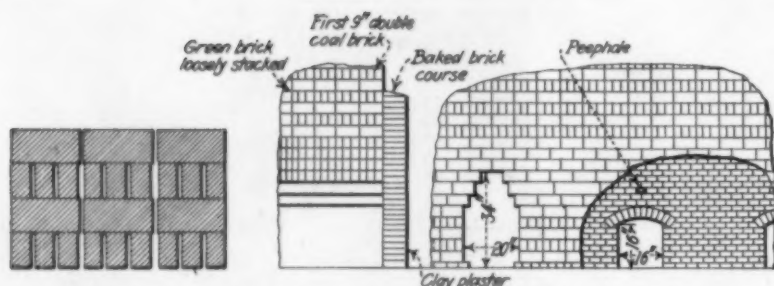
permit handling. They are then ready for the kiln. Coal and wood were the fuels formerly used by the Lake View Brick Co. A wood fire was kindled in the arches and gradually increased until the "water-soaking" period was passed. Short heavy grates were then inserted in the ends of the arches. The outside courses (called headers) were then fired with coal. From time to time cord-wood was shoved over the grates to the center of the arch. When well-seasoned oak and maple cord-wood could be obtained, this method gave fairly good results. In recent years it has become impossible to obtain a suitable quality of cord-wood. Often the wood was green. Green wood increases the smoke nuisance and fills the spaces between the brick with smoke, thus shutting off the draft. Often it was necessary to "dynamite" the kiln in order to clear away this smoke. This, of course, resulted in considerable loss in brick. Careless firing often fused over the openings between the brick.

The fusing was almost impossible to detect with an arch filled with wood and coal. In spite of the poor fuel used, the consumption of fuel was surprisingly low. Tests showed that $1\frac{1}{4}$ tons of Franklin County coal and $1\frac{1}{4}$ cords of wood were sufficient to burn an arch containing 39,000 brick.

The kiln is fired from both ends of the arches. The method of firing is as follows: The arch is fired slowly



City gas with a B.t.u. value of 535 is the kind of fuel now used in this brick factory described. Gas is supplied to the burner at a pressure of 10 lb. An ordinary pipe burner in conjunction with an ordinary atmospheric mixer is used. The air shutter is opened just enough to admit sufficient air to prevent the flame from blowing off the end of the burner. The gas passes through a $\frac{1}{4}$ -in. spud. Sufficient velocity is obtained to inspirate the air for combustion around the outside of the burner. In this illustration the gas meters for the individual kilns are shown with appropriate controls, tapped from the large mains at the top of the picture.



Green brick from the kiln piled three on three as per the sketch at the left. The rest of the drawing shows the methods of building the arches through which the brick are fired.

for the first few hours to dry the brick in the immediate vicinity of the arch. The heat is then increased until a temperature of about 2,200 deg. F. is obtained. This temperature is then maintained in the arch while the heat works upward. When the brick are red hot about five-eighths the way up the kiln, the heat is turned off and the fuel appliance is removed. The natural draft of the kiln draws an enormous amount of air through the arches and up through the kiln. This air is heated as it passes through the hot brick at the bottom of the kiln and in turn gives up a portion of its heat to the cold brick at the top. It takes from 5 to 12 hours after the heat is turned off before the brick at the top of the kiln are burned. Radiation and conduction also play an important part in this heat transfer. About 1,600 deg. F. is the temperature attained at the top of the kiln. This temperature is sufficient for vitrification of the clay. The steam coming from the brick acts as a damper and prevents a too rapid flow of air through the spaces between the brick and thus prevents an enormous loss of heat. There is quite a knack in firing a kiln of this type. If fired too rapidly, the arch brick fuse over, closing the space between the brick and thus shutting off the draft. Also the steam is generated too rapidly and therefore cannot escape fast enough to prevent condensation on the cold brick at the middle of the kiln. The brick absorb this moisture, become soft, and are crushed by the weight of the brick resting upon them. If fired too slowly, the steam escapes before the heat has traveled upward and thus the damper effect is lost. No matter

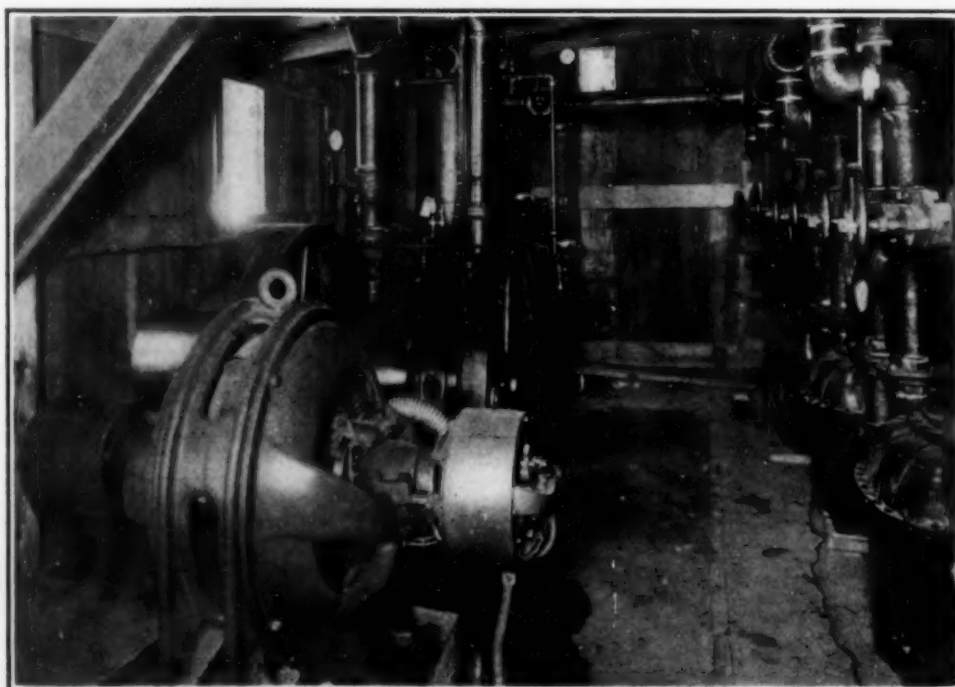
what quantity of fuel is used, the brick cannot be burned, because the heat escapes through the spaces between the brick.

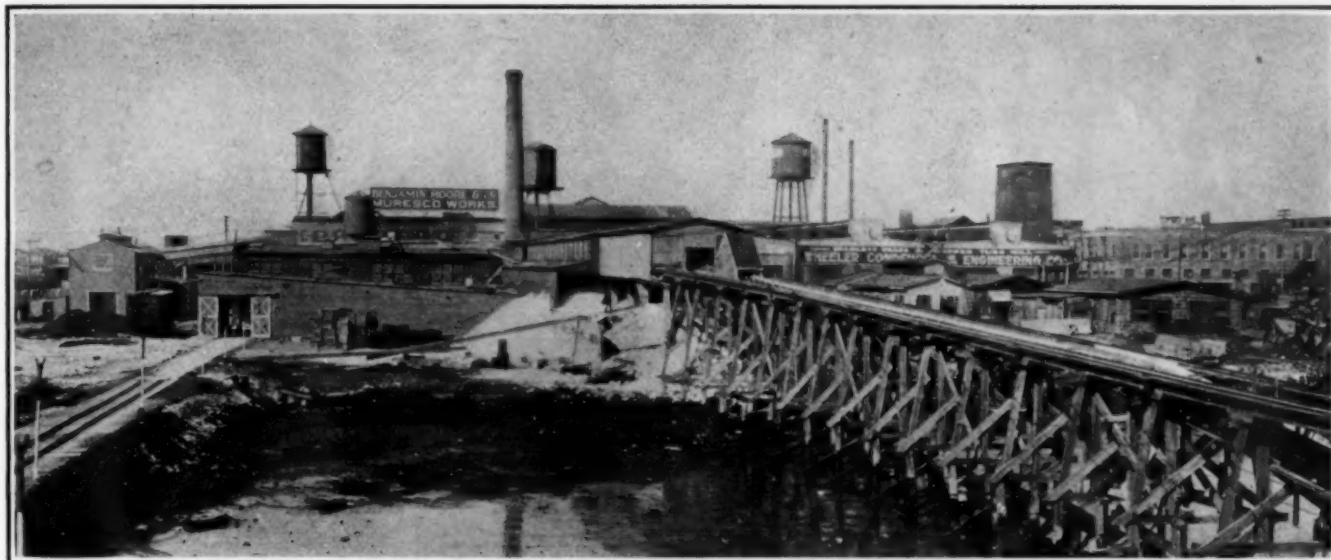
The length of time of burning is determined by the height of the heat, by the volume of sulphur smoke coming off and by the amount of settle of the kiln. All three factors vary with the clay and with the amount of moisture in the clay so that the final determination is the judgment of the operator.

The amount of heat conveyed to the center depends somewhat upon the weather, the clay and the amount of moisture in the brick. Regulating the size of the small opening just above the arch regulates the heat to a certain extent. When there is too much heat at the headers, a flow of air through this opening conveys the heat from the headers to the center.

A small "dog-house" is built in front of the arch. The pipe burner is placed in the center of the opening in the "dog-house." The burner is directed downward at an angle so that a line passing through the axis of the pipe burner would intersect the bottom of the arch at the center of the kiln. The opening in the "dog-house" is closed with brick and only enough air for combustion is admitted at the start. As the arch heats up, more and more air is admitted until the heat has traveled about five-eighths the way up the kiln. The gas is then shut off, the "dog-house" is torn down, and the front of the arch opened up to permit of the admission of the maximum amount of air. It takes about 5 hours after the gas is turned off for the heat to travel to the top of the kiln.

Compressors for supplying gas under pressure at the burners

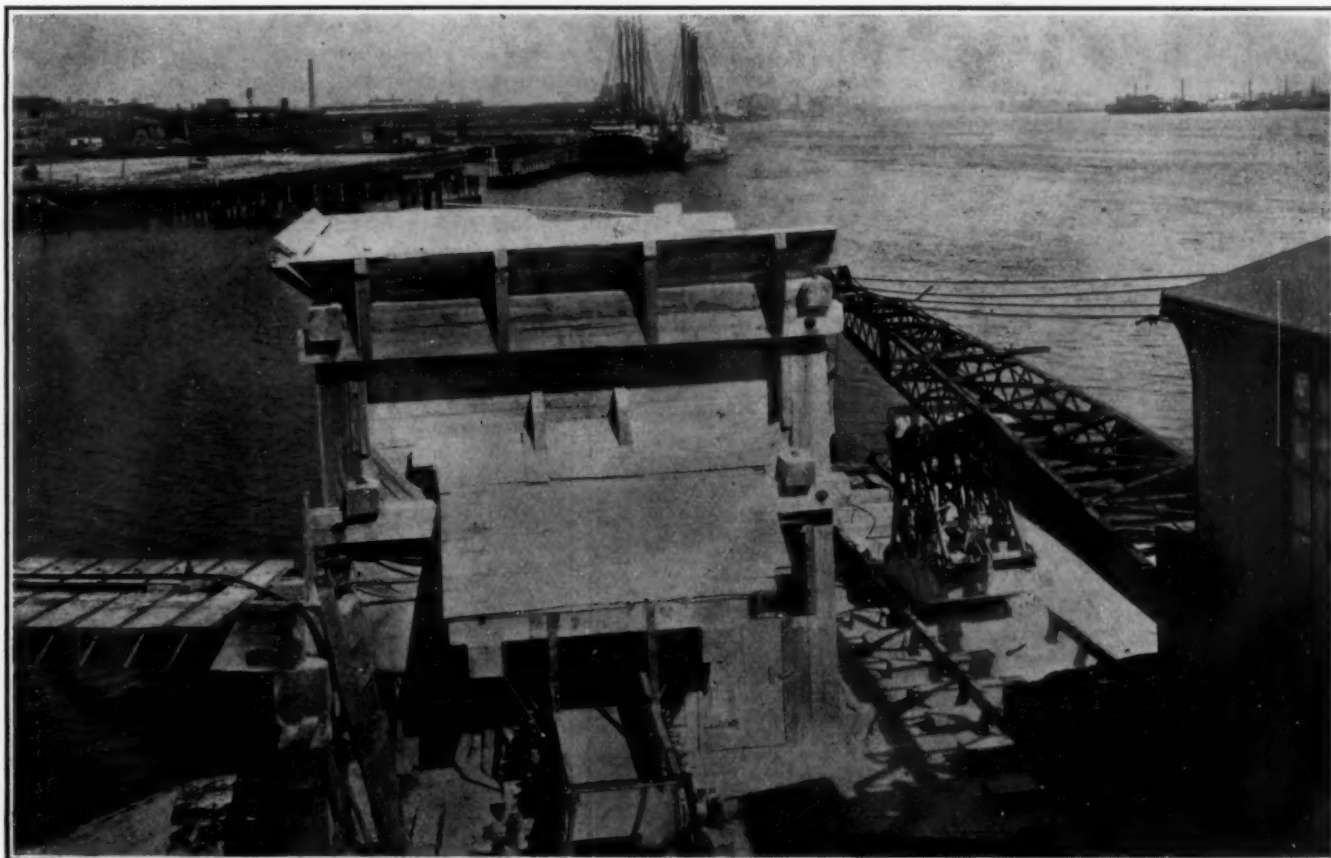


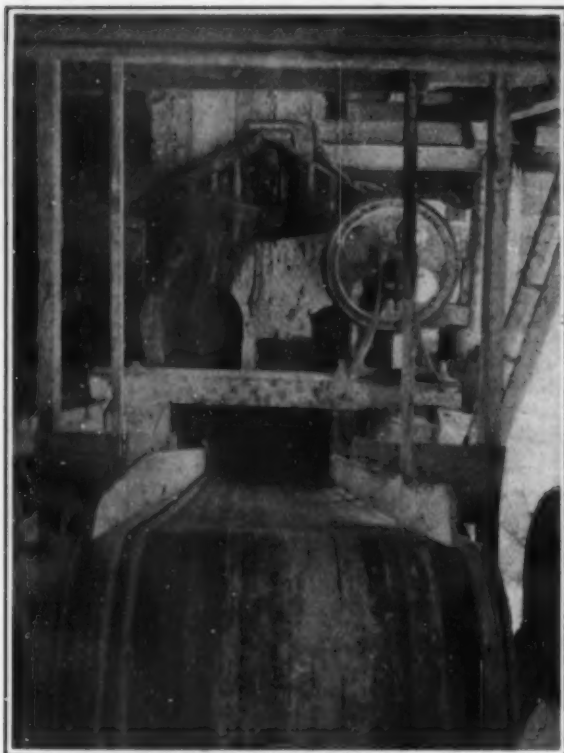


"It Pays to Modernize"

Cutting Production Cost in Half With Selected Equipment

These Illustrations and Those on the Two Following Pages Tell a Story of Technical Progress That Will Appeal to Every Engineer—They Carry a Challenge Too—They Seem to Say, "Can You Afford Not to Modernize?"





(LEFT) The specially designed Kent mill, consisting of chilled steel toothed rolls, between which steel picks work up and down, will crush the chalk without permitting it to pack and clog. It feeds the Robbins belt conveyor shown in the foreground and also in the illustration above. From this it is tripped to the bins below the conveyor.

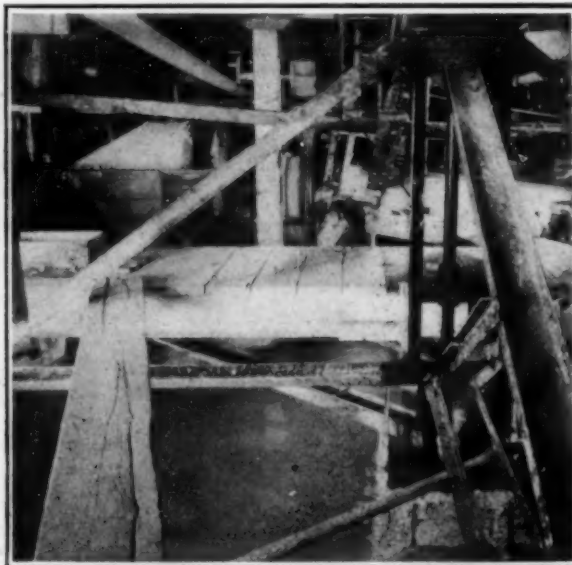
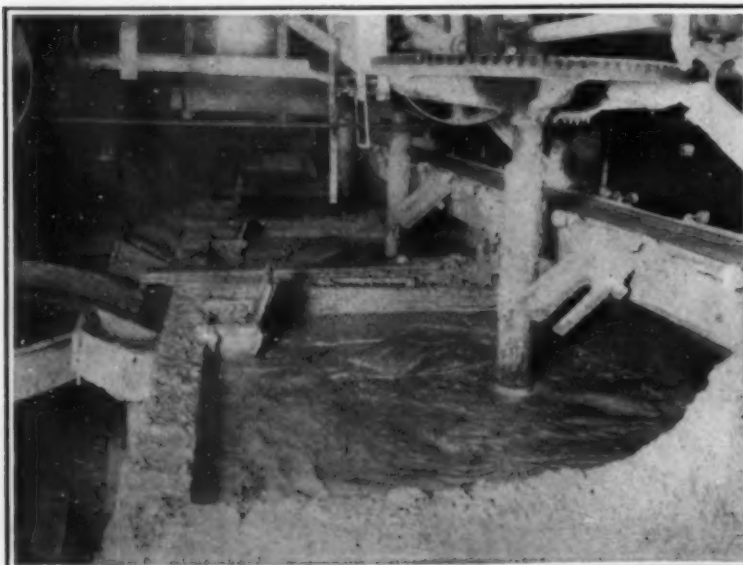
From Chalk To Whiting With Economy

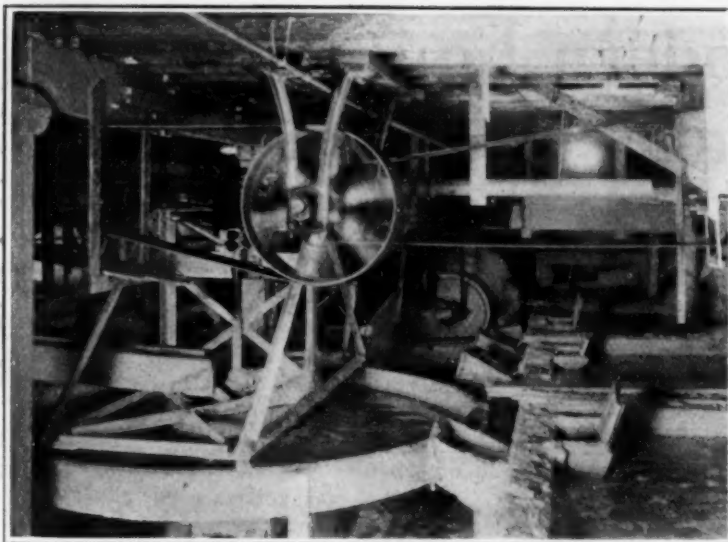
(BELOW) The wet grinding process is carried on in "mullers." They are fed from the belt on the right and make five revolutions per minute, tanks being about 4 ft. in diameter.

(RIGHT) One of the hydros separators (a Dorr thickener operated over capacity) which receives the overflow from the mullers and delivers 1 part solids to 24 parts water with 94 per cent solids through 300 mesh.

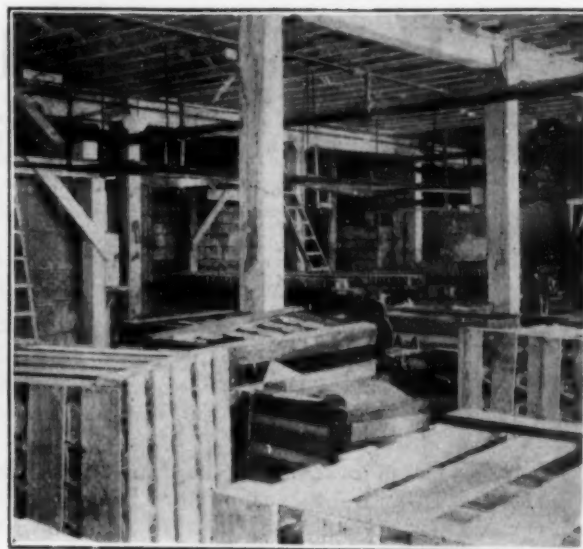
THE manufacture of whiting from chalk at the Benjamin Moore Co. plant is a splendid example of first-class technology, up-to-date operating methods and modern equipment applied to a relatively simple process. Pulverizing crude stone to an impalpable powder does not present technical difficulties at all comparable to many processes in the chemical engineering industries. Yet its very simplicity might have been a stumbling block to the attainment of the present good results. It's often too easy to let well enough alone.

When the Benjamin Moore Co. unloads crude chalk from France at its plant in Carteret, N. J., and changes it, by grinding, into whiting, considerable is added to the value and utility of the material. In a word, they **MAKE IT MARKETABLE.**



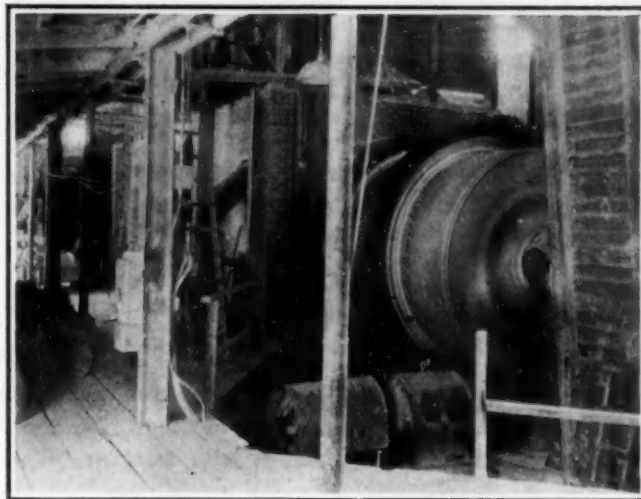


(ABOVE) A Dorr bowl classifier that frees the grit from the hydroseparators from the fine material. The grit is then conveyed to the Hardinge mill, visible in the preceding illustration, where it is pulverized.



(ABOVE AT RIGHT) Wooden tanks and Dorr thickeners, used to concentrate the pulp, prior to complete dewatering by filtration and drying.

(RIGHT) The Christie drier and in the distance the Owen filter. The final material contains less than 0.7 per cent water. These two units have replaced plate-and-frame presses that were dumped by hand and carried to steam tables for drying. The absence of dust is not the least noteworthy contribution of the new equipment.



Of course that is what all industry does, but it is more apparent in a case of this kind, where the material undergoes no chemical change and where there is only one product.

It is vastly significant that, in such an industry, where the technology is relatively simple, it has been worth while to install modern chemical engineering equipment. It has been worth while because the product of the continuous system of operation is uniform and, in spite of higher power requirements and greater investment, the production costs are lower. There is another fact that is favorable to the modern equipment. There are no loop holes for the escape of valuable material.

There are comparatively few steps in the process: A preliminary crushing, the wet grinding, or "mulling," in which the material is crushed mostly to 300 mesh or smaller, the separation of grit by the ingenious use of an undersize thickener, the concentration of the pulp in another thickener, and finally filtration and drying of the filtered material. The pictures tell the story of the various steps, and it only remains to enlarge very briefly on a few of the more important points.

GRINDING TO BETTER THAN 300 MESH

The wet grinding operation in the mullers is practically the only survival of the old process. It is familiar equipment to many engineers and resembles

the Chile mill except that there is but one muller in each vat and the vat is kept nearly full of thin sludge (1 part solid to 11 parts liquid). The mullers are of stone, 14 in. thick and 4 ft. in diameter. In about 2 years these wear down to a diameter of 3 ft. and are discarded. The vats are 5 ft. square and 4 ft. deep, with a cast-iron die plate in the bottom. This method of grinding is worthy of attention, as it can undoubtedly be applied to many materials of a similar character.

The overflow from the mullers is put through a neat system that permits no loss or waste. It is separated first into a suspension and a sludge. The suspension contains the good material (94 per cent through 300 mesh) and is concentrated in thickeners, filtered and dried. The sludge contains the grit which was formerly discarded after a rough separation from the adherent fines. Now it is classified and the grit is pulverized in a Hardinge mill, being then ready for mixing with the fine material from the mullers.

CUTTING THE LABOR CHARGE 60 PER CENT

From thirty-eight men and a woman to nine men of the same grade of intelligence may be considered a notable achievement. It is a byproduct of the modernization of the plant at Carteret and it carries a message and a challenge to those who have not modernized.

Is it worth while to cut production costs in half? For that is what has been accomplished.

Developing Modern Equipment for Cracking Petroleum

An Intimate Account of Early Difficulties Met by Dr. Burton and His Co-workers and a Description of the Cross, Dubbs and Fleming Processes

By R. H. Brownlee

Consulting Petroleum Technologist, Pittsburgh, Pa.

THE IDEA of cracking petroleum dates back before the birth of most living investigators of petroleum and its processes. In fact, its discovery, as applied to petroleum, may be classed as one of those mythical discoveries of time and chance that seem to tickle the imagination of the human race. With respect to inventions at least, we have for the most part retained our childlike wonder at something that happens without attempting to understand why. In fact, we prefer not to know, and love to believe that accidental and miraculous happenings gave us the mysterious mixture that puts pep in our motors or our glands as the case may be. This mixture has generally been discovered by some tyro and is usually alleged to be impossible of analysis by all the expert chemists in the world.

Atwood, however, in 1860 had received U. S. Patent 28,246, which describes a method of increasing the yield of illuminants by cracking and distilling at atmospheric pressures. Young secured British Patent 3,345 in 1865 for what is apparently the first process utilizing pressure to decrease the boiling temperature of the oil. Benton, U. S. Patent 342,564 (1886) also applied pressure.

According to these two patents, the pressure was released prior to condensing the evolved vapors. The Dewar-Redwood process (U. S. Patents 419,931 and 426,173, issued in 1890, and several British patents) was the first both to distill and to condense under pressure. All of these investigators might be said to have been unfortunate in that they made their inventions before the time when there was any large demand for the products they could produce, for it will be recalled that the industry was chiefly interested in kerosene. The production of gasoline by distillation to produce kerosene and lubricants even several years after the advent of the omnipresent flivver was in excess of requirements and to the writer's personal knowledge, gasoline retailed as low as 9 cents per gallon while kerosene was retailing at 20 and 25 cents. It was not until about 1910 that a few oil men began to see an impending shortage of their recent liquid white elephant. But before there began to be a real demand

for gasoline, all of the above patents had expired and apparently had been largely forgotten, especially by the Patent Office examiners. In any event, up to this time no practical commercial equipment had been developed for carrying out the process of cracking heavy oils to form products of lighter specific gravity and to Dr. W. M. Burton and the Standard Oil Co. of Indiana deservedly goes the credit for this.

Regardless of all the present claims and counter-claims one fact at least can be proved beyond peradventure, and that is that the Burton equipment was the first of any design to produce real commercial quantities of gasoline. We are not speaking of what the Patent Office significance of "commercial quantities" may be, but in the language of the oil man, the Burton process produced sufficient gasoline "to fill a row of ninety-footers."

To a novice in the science and art of radio, it seems that almost any sort of arrangement or hook-up of heterogeneous coils, condensers, etc., will enable one to listen in, but further experience indicates a vast difference in the adaptability and efficiency of different sets. Analogously, almost any system of coils, stills, furnaces, towers, condensers, etc., might enable one to crack heavy oils to make some gasoline. It is not strange, therefore, that since the advent of cracking equipment there has been developed a large number of different types of equipment

of which only a few have proved successful. In view of the intense activity along this line during the past decade in the United States, it is interesting to note that in England, where a notable but premature invention was made, there is only the most meager reference to cracking in two of the most recent and authentic books on oil and refining.

A great many factors enter into the development of a commercially successful process and without a doubt some valuable developments have never really arrived because of lack of financial backing.

The money spent by many minor companies without adequate return has been very large, while other relatively small companies have got excellent returns by following simple designs and methods of operation. The

"Legend has it that it is to a stillman who took a nap while on duty that we must ascribe the honor of first noting the cracking of petroleum. If the facts could be fully developed, we would wager all our patents for processes to crack petroleum that this event happened between 1 and 4 a.m. of a Monday night following the barbarous grind of the one-time honored Sunday 24-hour shift. At any rate, it is said that a stillman in Newark in 1861 banked the fires and left them for several hours and upon his return found the stream of distillate of lower specific gravity than when he had left."

attitude of many who have backed cracking processes seems to be that they fully expect someone suddenly to hit upon a method or equipment that will immediately revolutionize the industry. They fail to realize that when such a process appears, if it ever does, it will necessarily be the product of, first, a high-class idea, and second, extended, painstaking effort.

The best known of the modern successful cracking systems are those of Burton, including the modifications of Humphreys, Clark and many others and called by many different names, and those of Cross, Dubbs, Fleming, Isom and Holmes-Manley. The first three of these

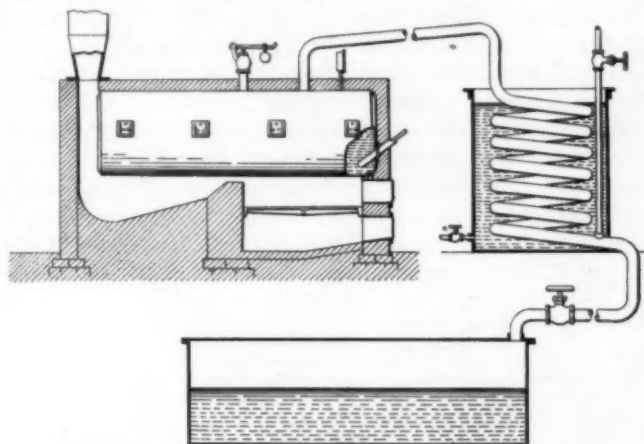


Fig. 1—The Original Burton Process for Cracking Petroleum
This diagram is that given in the first of the Burton patents, No. 1,049,667, issued Jan. 7, 1913, and for which application was filed July 3, 1912.

have been described so fully and so often in the various technical journals that it seems scarcely necessary to do more than to summarize here some of the chief points relating to them.

BURTON'S EARLY DIFFICULTIES

Figs. 1 and 2 illustrate the original Burton still and the Clark modification. As previously indicated, the experimental work upon this still started about 1910, when it was recognized that the demand for gasoline was likely to become very large. The cracking of oils in the vapor phase and the use of various catalytic agents such as ferric oxide and aluminum chloride were first tried. It is a matter of personal knowledge that, especially with aluminum chloride, excellent results were obtained from the standpoint of yield and quality of product. This work was virtually abandoned by the end of 1911, later to be more completely developed by Gray and McAfee, as will be referred to later. After this, the problem of pressure distillation was attacked—first, in a small still having a capacity of about 100 gal. Some of the early work was done with residuum or crude oil from which the lighter valuable products had been removed. It was found, however, that while light low-boiling distillate was obtained when this product distilled, the quantity of coke deposited on the bottom of the still rendered it dangerous to hold pressure in the still. Accordingly, high-boiling distillates from the crude—that is, oils boiling over 225 deg. C.—were used. These distillates were distilled at a pressure of about five atmospheres and at a moderate temperature, so undoubtedly the cracking was chiefly done in the liquid phase. Low-boiling fractions of the light distillate from this operation were found to consist mostly of the paraffine series of hydrocarbons, which were easily deodorized and finished into marketable products. The

yield of salable liquid that could be refined was considered satisfactory and the production of fixed gases and coke was relatively small.

Experimentally, the work was considered successful and preparations were made to install a larger still constructed of $\frac{1}{2}$ -in. steel plate and 8 ft. in diameter and 20 ft. long. The charging capacity was 6,000 gal., and arrangements were made to operate this still at the cracking pressure of 100 lb. per sq. in. Great difficulty was at first encountered owing to leakage around rivets and along the seams. Calking of the leaks of a pressure still was found to be a very different matter from calking a tubular boiler. Frequently it occurred that after the joints were calked the leaks were worse than ever. This difficulty was overcome when it was found that as the still remained in service the leaks were automatically stopped by carbon deposits. Many other problems were encountered. A safety valve that would operate in spite of the heat and carbon deposits was required. Some oils did not evolve enough gas to keep up the required pressure, while others evolved more gas than was required. Accordingly it was necessary to devise some method of relieving the pressure in the one case and adding to the vapor pressure in the other. This problem was solved by connecting a number of stills in such a manner that the extra gas from some made up for the shortage of others.

"It was also learned that a dephlegmating system was necessary, when operating at moderate pressures, to separate the light fractions and to return the heavier to the still. The first 6,000-gal. still was charged with 'fuel oil' ranging in boiling point from 200 to 350 deg. C. A 'substantial yield' of a product boiling from 50 deg. to 200 deg. C. was obtained. The loss averaged less than 3 per cent. The high-boiling residue from the still was similar to natural asphalt." And Dr. Burton further states, "Evidently we were doing artificially

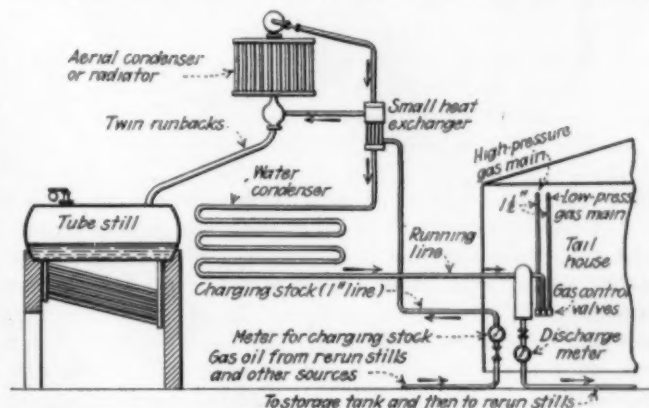


Fig. 2—Modified Burton Cracking Still
Comparison with Fig. 1 will show the many important modifications that later inventions have brought to the original process. Note the substitution of the tube still constructed on the principle of a Heine boiler.

what Nature had done in ages gone by—viz., distilling petroleum under pressure."

During the experiments upon this larger still at times the problem of the deposition of carbon was considered almost unsolvable. The persistent efforts, however, of Dr. Burton and Dr. Humphreys and their assistants solved this problem by the introduction of movable plates in the stills which collected much of the carbon and prevented its deposition on the bottom of the still where it could cause a hot bottom. Several months was devoted to experiments with the 8x20-ft. still.

These were so successful that a large appropriation was given for the erection of forty stills each of which could be charged with 8,000 gal. of raw material.

FIRST COMMERCIAL UNITS

A great deal of doubt arose in the minds of many oil men as to the safety of these pressure stills, but in spite of the large number in use and the ever-present human equation, 8 years elapsed before a fatal accident occurred. The first Burton stills built in 1913 were of about 250 bbl. gross capacity. The shell and ends were made of $\frac{1}{2}$ to $\frac{3}{4}$ -in. mild steel plate, riveted and calked. The stills were provided with a safety valve draw-off line for the hot residue, with inclined vapor lines (that functioned also as a dephlegmator), with a condenser and a small round tank to act both as a trap and gas and liquid separator and with relief valves for gas and liquid.

The still was charged and heated to around 675 deg. F., whereupon cracking commenced and the pressure was built up to about 80 lb. per sq.in. by the gases evolved. Distillation proceeded over a period of

posited, it was possible to distill only about one-third of the oil from the still before it was necessary to shut down. By using these so-called false-bottom plates, however, two-thirds of the oil could be distilled in the single operation.

Further improvements were made by E. M. Clark which involved manifolding of the condensers so as to allow for the establishment of working pressure on a recently charged still by means of the gas evolved by stills already in operation.

Additional inventions were made by others covering the nature of the dephlegmators and methods for venting the gases from pressure stills when the pressure becomes too high. This involved more ingenuity than would at first appear necessary in order to avoid ignition of the hot combustible gases. Mr. Clark also introduced the modification of the original Burton still which is not unlike a Heine boiler (see Fig. 2). This still has been operated to great advantage, although even yet some operators prefer the original type of still. The heat is applied to the still as it is to the Heine boiler, entirely through the tubes, the shells being set

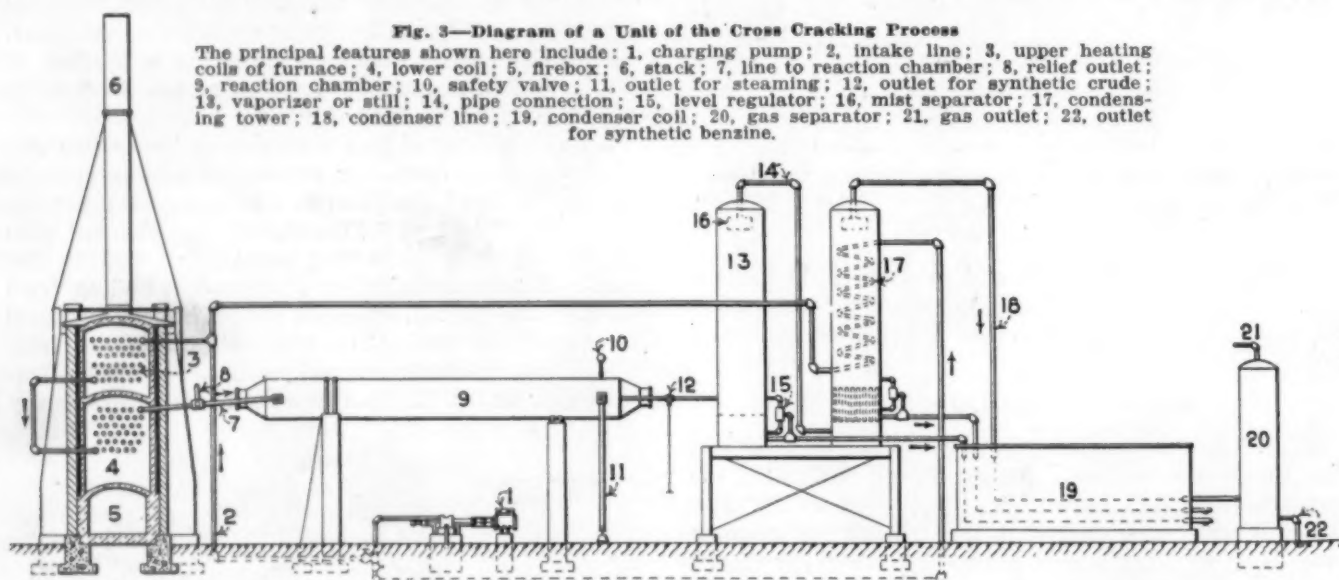


Fig. 3—Diagram of a Unit of the Cross Cracking Process

The principal features shown here include: 1, charging pump; 2, intake line; 3, upper heating coils of furnace; 4, lower coil; 5, firebox; 6, stack; 7, line to reaction chamber; 8, relief outlet; 9, reaction chamber; 10, safety valve; 11, outlet for steaming; 12, outlet for synthetic crude; 13, vaporizer or still; 14, pipe connection; 15, level regulator; 16, mist separator; 17, condensing tower; 18, condenser line; 19, condenser coil; 20, gas separator; 21, gas outlet; 22, outlet for synthetic benzene.

48 hours, in which time the temperature rose to 800 deg. F. and 60 per cent of light distillate was collected. The residue from the still, which contained granular carbon and also probably highly carbonaceous substances in suspension, was charged into stills, where it was run to coke. The coke so formed was equivalent to 5 per cent of the oil charged in the coking still. The distillate from the coking still was found to have extremely low viscosity for its specific gravity and this product is the basis for another patent. This distillate was either re-run in the cracking stills or used for other purposes.

IMPROVEMENTS AND MODIFICATIONS

The greatest source of difficulty from the first was because of the fact that carbon was inclined to deposit on the still, causing the bottom to overheat and necessitating a shut-down. This was largely because of the poor circulation of the liquid in any simple still, and the solution of this difficulty, as before indicated, was accomplished and covered in patent granted to Dr. R. E. Humphreys.

Previous to the use of Dr. Humphreys' invention, which consisted of movable plates suspended from the side of the still upon which most of the carbon de-

over a heavy layer of brick. The chief advantages of the tubular still are:

1. The more effective absorption of heat from the furnace as a result in particular of larger heating surface and also because of the rapid circulation of the oil and the consequent lower deposition of carbon in the heating surface.
2. Greater safety and ease of operation because hot spots on the still bottom are impossible.
3. Carbon suspended in the oil is deposited on the unheated bottom of the still on account of the slow circulation of the oil in that part of the still.
4. Larger output in given time.

As a general thing the pressure still is operated for a period of approximately 48 hours unless the run is terminated by the excessive deposition of carbon. Accordingly the usual cycle of operation, including charging, running, cooling and cleaning, is 72 hours. The yield of gasoline in a single pressure distillation is ordinarily 30 to 35 per cent. The unsaturation of the gasoline is about 10 per cent. By using the tubular still more cracking stock is introduced after distillation begins, and thus it is possible to increase the throughput considerably. The fixed gas from a pressure still con-

sists chiefly of methane and ethane with ordinarily about 8 per cent of ethylene.

Including the number of Burton stills operated by the Standard of Indiana and their licensees widely scattered over the country, with a few in foreign countries as well, we find an immense total of operating units, from which is obtained by far the larger share of all of the cracked gasoline produced.

HOW THE CROSS PROCESS OPERATES

The Cross equipment,¹ developed by Dr. Walter M. Cross and Dr. Roy Cross, of Kansas City, Mo., has been installed in a number of refineries. Fig. 3 shows the diagrammatical arrangement of the Cross equipment in accordance with its earlier design. Originally, the Cross brothers started by building a smaller unit which produces approximately 200 bbl. of gasoline per day while on stream and operates continuously from 5 to 30 days, depending upon the nature of the charging stock. Their larger units will treat 1,000 bbl. of total oil or 500 bbl. of new oil per day and give a daily output of 300 or 400 bbl. of gasoline. Recently improvements have been made to the Cross plant which include the substitution of bubble towers for the old type of dephlegmators. This gives end-point gasoline direct from the cracking process instead of the pressure distillate formerly produced.

It is claimed that the Cross process will yield 40 per cent of gasoline from average fuel oil, 65 per cent from gas oil and 75 per cent from kerosene. On the basis of daily throughput the Cross equipment produces about 30 per cent of new navy gasoline. The equipment has been operated on practically all possible stocks, but the most satisfactory field for the operation of this equipment is upon overhead distillates.

The Cross cracking unit operates at a pressure of 600 lb. per sq.in. or more and the oil passes through the system approximately as follows:

The oil is pumped in through a line to a preheating coil, where the oil is heated to about 350 deg. F., and thence to the furnace. The oil passes downward through the upper bank of tubes to a lower bank, then upward through the lower bank, the oil reaching a temperature of 800 to 900 deg. F., which is recorded in the pump house. The heating is accomplished by fire burning in the combustion chamber underneath the lower bank of tubes and flames are prevented from touching the tubes by means of a specially designed perforated arch. The pressure maintained prevents the oil from vaporizing at this temperature. The oil continues to flow from the furnace through transfer lines to the reaction chamber, where the conversion of the oil into gasoline is accomplished, accompanied by a slight drop in temperature and a deposition of the carbon that always forms in cracking operations.

No external heat is applied in this reaction chamber, which, however, is heavily insulated to prevent loss by

radiation. In the reaction chamber the converted oil is allowed to escape through a valve whereby the pressure is controlled on the system just described. This is the end of the cracking operation. The desired conversion has been accomplished and about 30 per cent of gasoline is now present in the oil. The subsequent treatment is simply a separation of the synthetic crude into the fractions desired. This is carried out in towers and by atmospheric distillation and fractional condensation. Fuel oil or residuum separates in the first tower and gas oil in the second tower. Benzine containing the gasoline which was formed in the reaction chamber leaves a second tower as a vapor, which is condensed into a liquid in the cooling coil beneath, whence it flows to the gas separator. Here the non-condensable gases are separated from the liquid and are returned to the furnace for fuel, no other fuel being required under normal operation after the cracking is once started.

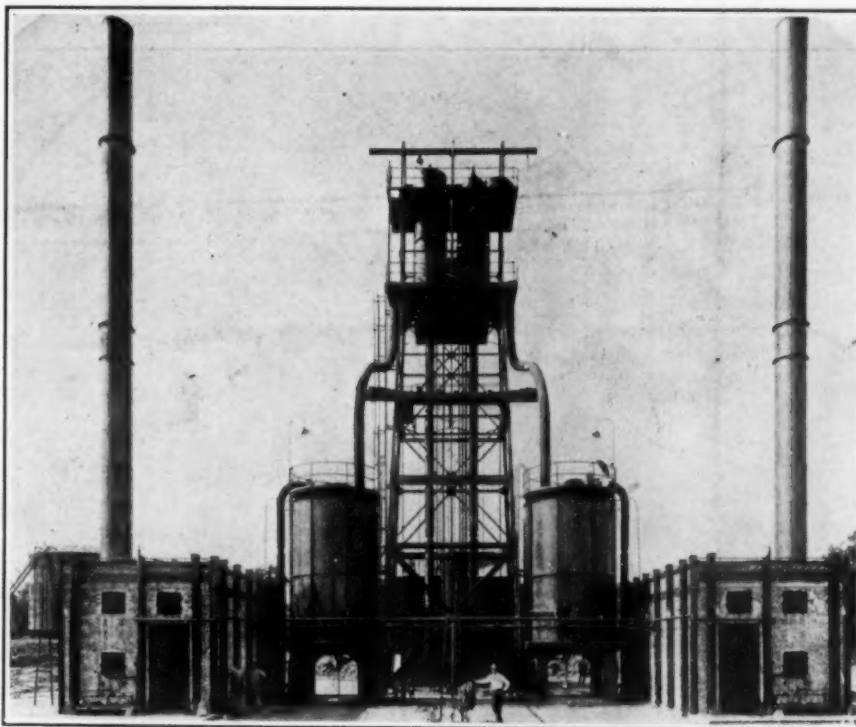


Fig. 4—A Double Unit of Dubbs Equipment
An installation at the Johnson Oil & Refining Co., Cleveland, Ohio.
Photograph made Oct. 10, 1923.

Likewise the liquid benzine flows from the gas separator to the storage tank and the fuel oil and gas oil from the towers have been cooled and delivered to storage. The fuel oil that separates in the first tower has a gravity of 16 to 20 deg. Bé., zero cold test, and a viscosity corresponding to that of light oil distillate. The gas oil separated in the second tower is practically the same as the original charging stock and is used over again, preferably in a mixture with new charging stock.

Approximately 50 per cent of the original charging stock is returned for the recycling, and the ultimate yield of gasoline is thereby increased to 60 per cent and upward. The operation of the unit is continued for 6 to 25 days, when it is necessary to shut down and clean out the coke from the reaction chamber. Fine carbon is also removed from the furnace tubes.

Another type of equipment that has received a great deal of publicity and is also quite generally accepted both in this country and abroad is that of the Universal Oil Products Co., of Chicago.

¹A full description of the Cross equipment will be found in the *Oil and Gas News* for February, 1924.

Fig. 4 is from a photograph of an installation of two Dubbs units. The oil being charged to the system is pumped at a uniform rate either directly to the heating coil in the furnace or to the dephlegmator, where it is preheated by the condensing vapors, or to both simultaneously as regulation requires. The oil enters at bottom of the heating coil and passes upward through fifty 4-in. tubes 30 ft. long connected into a continuous coil by steel fittings. Here it is heated to the required temperature before it is discharged through a transfer line to the top of the reaction chamber, which is heavily insulated. The cracking is completed within the reaction chamber without the application of additional heat. The vapors from the reaction chamber pass to the dephlegmator and the residuum is drawn off, cooled and run to storage, while the coke remains in the chamber until the end of run, when the ports are opened.

The temperature of the vapors leaving the dephlegmator is largely controlled by the proportion of cool

yield of 40 per cent of gasoline on the basis of the daily throughput. Much larger yields than this have been secured on certain grades of stock.

One of the interesting features claimed for the Dubbs equipment is the wide range of charging stock that may be employed. It has been operated on all classes of stock, from light kerosene distillate to Panuco crude. The length of runs with the Dubbs equipment is based chiefly upon when the reaction chamber becomes filled with coke. One 10x15-ft. chamber will hold from 30 to 35 tons, and in some plants, where it is expected to operate upon heavy charging stock, two such chambers are installed for one cracking unit. When running upon light gas oil or kerosene distillate, naturally the percentage of coke is proportionately very small and therefore the runs can be extended to 20 or 30 days.

Simplicity of operation and safety are two of the important factors in the Dubbs equipment. In a 500-bbl. plant, only 10 to 12 bbl. of oil is actually in the heating zone at one time. In the reaction chamber there would be an additional 20 to 25 bbl., but this is outside of the fire zone and cannot siphon directly to the coils. Operating pressure is not in excess of about 140 to 160 lb. per sq.in. In all properly arranged tube equipment it has been shown that the amount of coke that deposited on the tube is extremely small and hence the actual danger from any accident to a tube with any reasonable care is almost eliminated.

There is a great flexibility permitted in the use of the Dubbs equipment because of the wide range of charging stock and varying rates at which these charging stocks can be run, depending upon what products are desired. It is possible to crack up the charging stock and re-run so as to produce practically nothing but gasoline and coke, or one may make gasoline, gas oil, fuel oil and coke in varying proportions as conditions

and the market require. The coke produced by this means is a good commercial fuel and is marketable for a number of purposes in case it is not used in the plant.

THE DIFFICULTY IN COMPARING YIELDS

As previously indicated, it would seem that the only fair way to compare the yields from different processes is by the daily throughput. There have been many modifications of this which have mostly caused confusion in the minds of those it was desired to impress. One interesting fact should be pointed out: you will notice a great similarity between the actual yields from different equipments for one throughput unless there is some facility for refluxing within the system whereby the proportion of gasoline contained has been increased. This undoubtedly is due largely to the more or less reversibility of the reactions involved in the cracking of gasoline and consequently, if the conditions approximate one another, the yields of gasoline must necessarily be approximately the same. However, this does not argue that one equipment is equivalent to another, because there are very great differences in the method of handling and the safety of the system and ease of

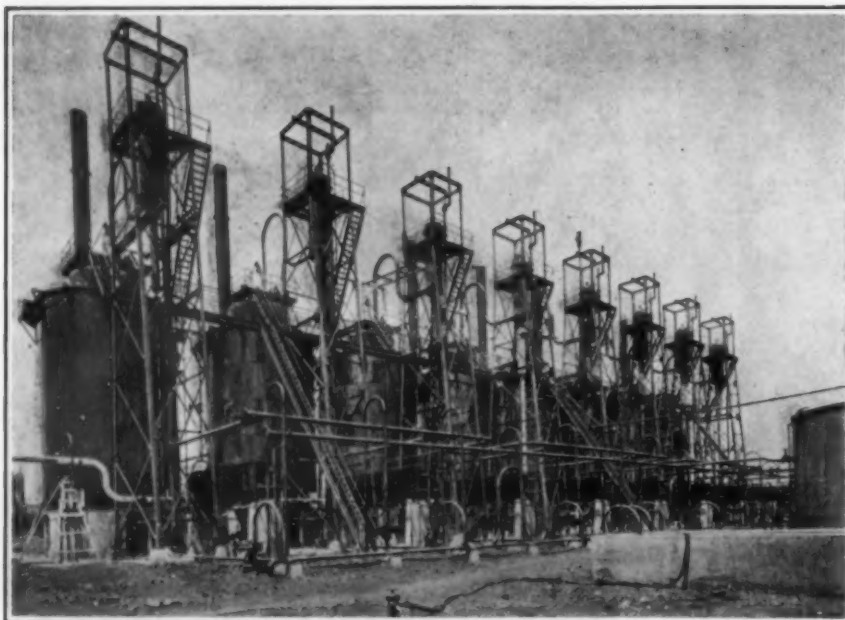


Fig. 5—An Eight-Unit Fleming Cracking Plant
A feature of this installation is the steel-jacketed furnace instead of the all-brick construction formerly used.

charging stock introduced therein and hence the properties of the distillate taken off and the reflux oil that returns to the heating tubes for further cracking. The light vapors pass to a condenser and thence to the pressure distillate receiver. At this receiver the operator regulates the discharge of gas and distillate by means of suitable valves, which thus control the pressure on the system. The early Dubbs units, of which there are said to be only two in existence, have a rated capacity of 250 bbl. each. All of the newer units have a standard rating of 500 bbl. daily throughput. As a matter of fact, this rating is based upon a maximum yield of gasoline and in the event it is desired to get a greater throughput with a lesser percentage of gasoline, a much greater amount, even up to 1,000 bbl. or more per day, can be run through the installation with a large total yield of gasoline, but, as indicated above, a smaller percentage return. A recent addition to the standard Dubbs equipment of nominal cost increases the above throughput per day by approximately 50 per cent. As shown by official reports of the company and from experience with the equipment, the Dubbs plant will turn out better than the average

operation and there are involved a great many different conditions. In processes, however, in which there is actually secured in one throughput a larger percentage of gasoline than in another, as is the case with the Dubbs process, it is due to better and more efficient method and equipment for constantly refluxing the material without allowing it to pass out of the system. In other words, any equipment that makes simply a synthetic crude is naturally limited in the percentage of gasoline possible to make and it is only by this constant refluxing that it is possible to increase the yield from one throughput.

DESIGN OF FLEMING EQUIPMENT

The Fleming cracking process is the invention of Richard Fleming and is now controlled by the Richard Fleming Co., of New York.

The first plant was installed at the Martinez refinery of the Shell company of California and was put into operation in May, 1920. It is now understood that this plant has been shut down for some time. Fig. 5 shows the recent type of construction in an eight-unit installation. The following description of the process was supplied by the maker of the equipment, the M. W. Kellogg Co., of New York.

The still proper (see Fig. 6) is a forge-welded steel drum, 10x30 ft., set on end in a furnace. The shell is 1 in. and the head 1½ in. in thickness. Four burners are used, set tangentially to the shell to give the gases from combustion of the fuel oil a swirling motion about the shell. The furnace is designed so that the entire circumference of the still, except for a very few feet bottom and top, is swept by the flue gases which leave the setting only 100 to 150 deg. F. hotter than the contained oil. From the still the vapors pass to a dephlegmator. Here the feed going to the still meets the hot vapors, condensing the heavier fractions and carrying them back into the still. A novel feature is a bypass on this bleed-back line through a coil, water cooled, from which it may again pass through the dephlegmator, thus aiding in the control of the outlet temperature.

The vapors leaving the dephlegmator are condensed in an apparatus of the jet type. The arrangement is such that a needle-type valve releases the vapor between the two cones of water. It should be noted that the still pressure is maintained up to the needle valve, but that in the throat of the condenser itself there is no pressure—in fact, readings taken show a slight vacuum. Thus one piece of apparatus serves as a water-cooled relief valve and condenser. The combined water and condensate are led through a separating tank, where the water is drawn off, and the fixed gases may here also be exhausted, the condensate thence flowing to the receiving tank proper. The losses compare favorably with other processes and demonstrate the fact that there is no appreciable absorption of the gas by the water. The scrubbing effect of the water is also valuable, aiding materially in cleaning up the distillate and reducing later treatment. The removal of the sulphur compounds in this way is a favorable feature of the apparatus. Other features of special interest are: the mechanical reliability of the equipment; the fact that there are more than 2 sq.ft. of heating surface per barrel of charge, and that there are no horizontal hot surfaces for carbon accumulation.

The still is operated on the batch and feed, or semi-continuous principle. The original charge is 295 to

300 bbl. and during the run 250 to 400 bbl. of additional stock is fed to the still. The first is for heavy gas oil or that containing a percentage of bottoms, while the latter figure may be expected from clean overhead stock such as Pennsylvania fuel oil.

The cycle will vary with the character of the stock charged. The still is on stream from 40 to 60 hours, the time being determined by the carbon deposition. To relieve pressure, steam, cool and clean requires 24 hours, making a total of 64 to 84 hours.

While relieving the pressure it is possible to utilize the contained heat in the still and setting to take off a second cut which will correspond closely to the original stock and may be used for recycling. The large amount of contained heat in the brickwork in the setting, together with the large heating surface, enables this step to be taken and eliminates re-running of bottoms necessary with other systems. By operating in this way, net yields of 50 to 60 per cent of gasoline

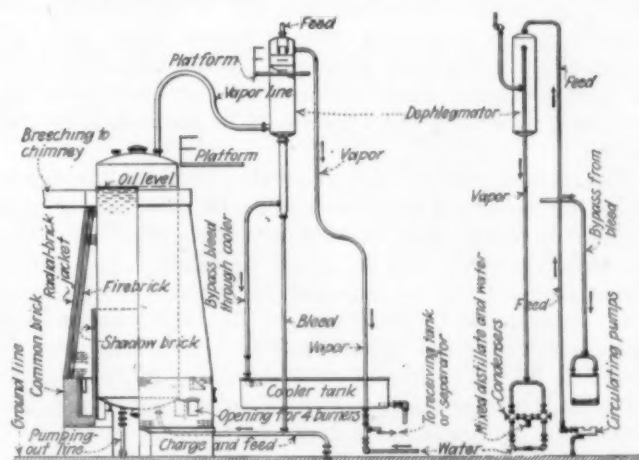


Fig. 6—Diagram Showing the General Arrangement of the Fleming Still

from the charging stock are possible. On the basis of daily throughput the yield of gasoline is about 35 per cent. For average conditions of operation the apparatus may be rated at 70 bbl. of new navy gasoline per unit per day from 200 bbl. of gas oil or charging stock. This figure includes idle time for relieving, cooling, cleaning, charging and getting up pressure.

The fuel consumption will average about 8 per cent of the throughput. A figure of 4 per cent has been attained when the fixed gas has been utilized as auxiliary fuel. This equipment is considered as a gas oil equipment, but at some of the installations a heavier overheated stock, such as wax distillate, is being charged into the equipment in connection with the ordinary gas oil charge.

EDITOR'S NOTE: In a third article on the cracking of petroleum Dr. Brownlee will discuss the probable developments of the future and will conclude his description of commercial processes with a discussion of Isom, Holmes-Manley, Rittman, Greenstreet, Forward, McAfee and Ellis equipment.

563 Petroleum Refineries in U. S. A.

On May 1, 1924, there were 563 refineries in this country with a total indicated capacity of 2,930,640 bbl. per day. Of these, 362 plants, with 87 per cent of the total capacity, were in operation. Of the 563 refineries 164 operated one or more cracking processes.

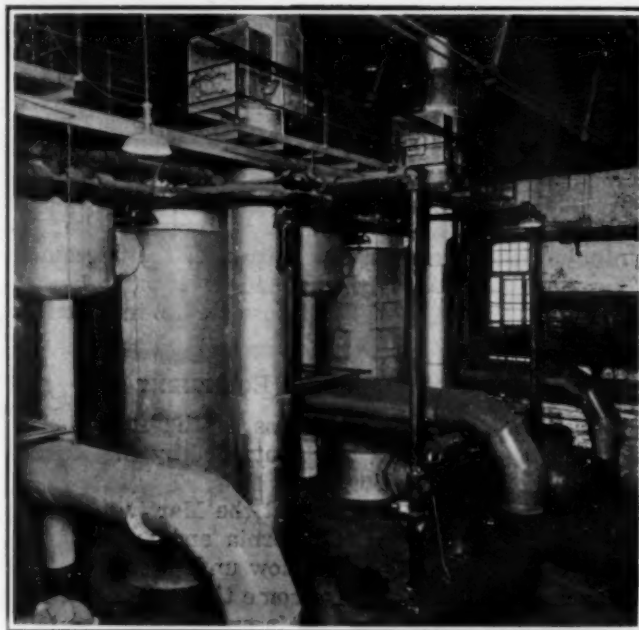
Getting Something for Nothing

**At Least It Seems to Be So
When Waste-Heat Boilers
Are Used on Water-Gas Sets**

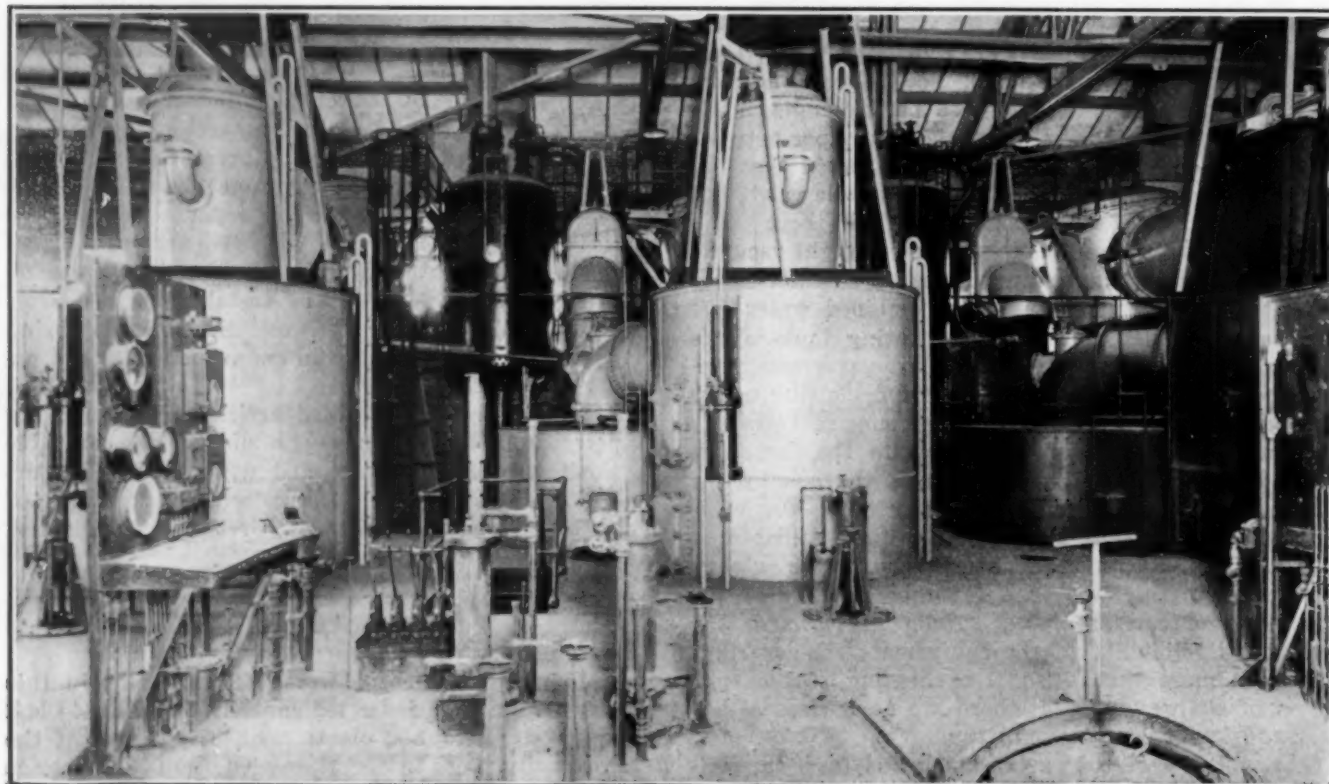
IN A paper before the Western Society of Engineers, April 18, 1924, F. W. Sperr, chief chemist of the Koppers Co., described "one of the most important developments in the direction of economy in modern water-gas manufacture—the use of waste-heat boilers. In order to appreciate what may be accomplished by utilization of the sensible heat of the gases from a water-gas set, it will be useful to consider briefly how the generator and auxiliary fuel are utilized. In good operation using high-grade fuel, 30 lb. of this is consumed in the generator per thousand cubic feet of carburetted water gas produced. Approximately half of this generator fuel is consumed for supplying the necessary heat and the other half is gasified with the steam.

The steam used in the generator amounts to about 30 lb. per thousand cubic feet of carburetted water gas. Ordinarily about half of this actually enters into the reaction, the other half going out undecomposed. Additional steam must be supplied for operating the auxiliary equipment of the plant. The boiler house fuel consumed for total steam requirements amounts to about 15 lb. per thousand cubic feet. If exhaust steam from the blowing engines is used in the generator, the boiler fuel equipment is reduced to 10 or 11 lb.

The blast gases leave the set at a temperature of about 1,350 deg. F. and amount to about 2,300 cu.ft. per thousand cubic feet of water gas. Utilizing these gases in a waste-heat boiler, it is possible to save the



equivalent of 5 lb. of boiler fuel per thousand cubic feet of gas. Most of the carbon monoxide escaping in the blast gases may be burned in the waste-heat boiler. Utilizing the sensible heat in the carburetted water gas and undecomposed steam, it is possible to save from 3 to 4 lb. additional boiler fuel, but the operation of waste-heat boilers on such gas is attended with considerably greater difficulty on account of the accumulation of pitchy material in the tubes. This material can be burned out, but the burning must be done frequently and produces some nuisance in the form of smoke, while the wear and tear on the boiler are considerable. The present-day tendency is to use waste-heat boilers on the blast gases alone and in this way, using exhaust steam in the generator, it is possible to save half of the boiler fuel that would be otherwise required.



*When technical men learn how to sell themselves,
their position in industry will be more secure*

Chemical Ingenuing

(Anonymous)

Being a Thoughtful Inquiry Into Why Men With Technical Training and in Particular Chemists Are So Frequently Unsuccessful in Coralling the Almighty Dollar

A POSTERIORI

NOWHERE is a lack of scientific method more painfully conspicuous than in the scientist's fumbings at marketing his profession. Our own guess is that it is no more than ostentatious nonsense to pretend that inquiry into the salability of one's handicraft smacks of charlatanism and is unworthy of one's august attention. Even Economics agrees that disposing of a vocation is of the same importance as mastering it. Yet, in this most enlightened of ages, here in the garden spot of the universe's foremost planet, the sagest of men—the chemist—refuses to analyze the market for his services, deigns to learn nothing save distemper from the thrice idiotic Pecksniffs who are eternally wailing our obloquy and, unless actually jobless, has only amused tolerance for the purport of the want ads.

Pleading the at best fallibility of

human judgment, we confess that to our modicum of understanding both the damning whine and the irrational conceit are alike disgusting and reprehensible. The ululations are unworthy of discussion, but serious attention to the problem of selling our ability is imperative if we desiderate to leave the mire. For no scientist who believes that his profession does or can render a real and important service—and any who do not were better telling fortunes or selling beads—can decently refuse to consider how his work may be rendered most effective. And, fiction's superstition to the contrary, neither a chemist nor a costermonger can work to the best advantage when oppressed by unsatisfied needs. When we salaciously peruse the Sunday supplement account of some eminent scientist's wife making off with the neighborhood bootlegger,

who can at least keep her in diamonds and gin, our natural sympathy for the worthy doctor is greatly corrupted by the suspicion that he deserved no such lenient form of punishment.

What we have been attempting to intimate, with such subtle and inoffensive circuitation as is ours to command, is that the chemist owes it equally to himself and the community to pause in considering the universe and view the world—that he, like the poet and the boiler-maker, must disabuse himself of the superstition that he is recognizedly an elect creature and apply himself intelligently to disposing of his wares. What follows is a report of a few preliminary findings concerning the principal fields now existent for such disposal. This being a virgin field, the treatment is perforce introductory and incomplete rather than exhaustive.

Propaganda Fide

*Alas, Education! How Many Are the Sins
Committed in Thy Name!*

ONLY with the greatest trepidation does the plebeian arcanumist invade the domain of those who reveal the exorcism of our thaumaturgy. But with that diffidence which is seemly we offer: That this business of indoctrination is riven into two fields which are as the poles, apart. For the professors of the first class, who toss morsels of knowledge to greedy embrionic chemists, we have a respectful lack of comprehension. But for those oracles who succeed in the other endeavor—in the monumental striving to cram some modicum of information into the craniums of froward diploma chasers, forced into Chemistry by an unreasoning curriculum—we have something nearly akin to awe. For, unfortunate as may be, the mumpsimus of non-chemical students is that prying into our diablerie is about as enticing and profitable as compiling the combined dicta of the Drs. Frank Crane and Friedrich Wilhelm Nietzsche would be.

But if students consider the study of our necromancy tedious or downright dangerous, the infatuation of

their conductors too often more than compensates for their delinquency. To hear one of these annointed oracles sonorously declaiming some desiccated doctrine as pithy as a December cornstalk is to suspect that he fatuously believes everyone as athirst as himself for enlightenment in every isolated fact which chemical ingenuity has discovered. With all due veneration for tradition—Figs!

The art of teaching requires a specialized biological functioning, proficiency at cozening, and gymnastic mental proclivities—all three. With the consuetudinary apology for introducing personal anecdotes, we remember a course of instruction, not convenient to designate, to which we were once exposed. Upon our first entrance to the sanctum we found our learned professor feverishly dividing the number of pages in the text by the number of lecture periods of the year. This computation complete, assignment was made and we were off willy-nilly in a ruthless pursuit of the last page. When an unexpected holiday disrupted our divine schedule, it was the cause for a considerably greater perturbation of our estimable tutor than were any indications of intellectual tardiness among the recruits.

Finally sweated through, we departed to much needed

vacations with the steadfast conviction that this pro-pædutic must have done us as much good as would a course of calomel, but was not quite so pleasant to take. And in short order we had systematically forgotten all of it—that is, all except an enduring antipathy to all things so-and-so.

But unto every university are given a few instructors worthy to be so hight. And so in our discovery of Commercial Law: It was a required course and our approach was, at best, neutral. But observing our cowed appearances, this man of wisdom assured us that he proposed no high-handed transmutation experiments at our expense. In short, he did not propose to turn us into lawyers in 9 months. He optimistically considered us potential engineers and intended to impart to us only such information as would be necessary to enable us to use and not be used by law and the legal profession. He refused to go further until he had convinced us that the knowledge which we had this splendid opportunity to obtain was as completely essential to our welfare as an occasional check from home. He avoided the text for so long that we had impatiently explored a quarter of it before the first assignment. But once under way, we fell upon contracts and negotiable instruments, so voraciously that by the end of the year even the football players were able to check up on their scholastic stipulations.

And our guess is that the way to teach Chemistry or Chiropractic is to begin at the beginning and proceed in the most logical order that can be devised. Thus we have, in our abysmal depravity, long believed that the first topic in a popular course in Chemistry should be—Chemistry. Hastening to defend this startling and dangerous heresy, we contend that thereby could be avoided such obvious and awkward subterfuges as have been commonly employed to trap the student's interest to his eternal bewilderment. Then, as attention narrowed to the specific, the one and only primary consideration, the atom, could be explained as the elemental entity with arms or valences whose combining power makes possible Chemistry, Life and Political Reform. We have seen "General Chemistries" that did not do this; we have seen texts without a diagram showing the periodic arrangement of the elements, minus the structural formula of an inorganic compound and bereft of even a simple statement of the valences of the elements as considered. And yet learning is said to be a rational process and not a senseless memorizing.

But enough for the indoctrinators. Their field is, deservedly enough, drawing a maximum of attention and the outlook is more favorable than ever before. As to those of their ilk who deal only with prospective chemists we have little to say. They have the advantage that they have never studied Education. And their problem is chiefly one of omniscience which is not particularly amenable to comment. They should strive for the alleged satisfactions of the allegedly intellectual life and thus attain to a sublime indifference to such

petty nuisances as the wailing of their undernourished offspring as mingled with the bloodcurdling yells of hapless freshmen in the long reaches of campus nights.

Pro Patria

Will Your Boy Be a Post Office Clerk or a Chemist?

That the government service should be a Utopia for chemists is the veriest apothegm. With steady assurance that national defense, agricultural puissance and industrial apotheosis will soon depend upon the laboratory, and that, with the exhausting of natural resources, the next generation will measure its opulence in terms of molecular conquest, the competitive need seems obvious. And the character of the work is such as to appeal to the chemist's ingrown proclivity to pioneer.

The remaining consideration, then, is the financial inducement offered. Most admirably suited to just such inquiry is the standardized scale of federal pay. We can determine with great accuracy the pecuniary enticement here offered to prospective recruits. "Why," asks the youngling with a high school diploma, "should I forsake the luxuries of home and submit to the atrocities of sophomores and upstart professors? Why should I seek this head-bulging eminence instead of, say, getting a job at the local postoffice delivering the *Saturday Evening Post*, *Sears Roebuck* No. 274 and *Uncle Billy's Whizz Bang* to the local intelligentsia? By

which procedure can I expect the most rapid ascent to, shall I say, success?"

Here is a popular question with an unpopular answer. It is one of those subjects by common consent relegated outside the pale of ethical pooh-bah. Yet it is a legitimate inquiry in these days when a plasterer's card is more to be prized than a new edition of *Beilstein*. So let's have at a session of soul searching. If the young man will spend 4 or 5 years obtaining a degree and successfully undergo an examination of his pedigree, training and erudition, he is graced with a rating P-1-4. He is said to be capable of performing, under direct supervision, simple and elementary work which does not require the exercise of independent judgment or initiative (possibly exterminating roaches and dusting beaker stretchers) at a salary of \$36 a week. If he had spent those 4 years—or only 3 of them—performing difficult and responsible clerical work he could have qualified to become a CAF-7-2, an administrator at 540 more dollars a year. But our comparison is to the mail carrier, who is also said to be underpaid. While our tentative neophyte has been spending \$4,000 for his education the postman has received \$6,200 in salary. But now the chemist begins to realize upon his investment of time, money and effort. Considering his possibilities after 10 years, at 28, we find that if he has received a single raise each year he will have been paid a total gross of \$12,380. Subtracting the \$4,000 expended during the first 4 years of the period, his net income is \$8,380; in the same time the letter carrier

Chem. & Met. salutes the author of this satire.

His modesty and position make it necessary to withhold his name. Yet he has already won for himself a place in the hearts of *Chem. & Met.*'s readers by his article called "Chemical Unreason" or, as he wrote it (backward), "Nosaernu Lakimek," which appeared in the issue of Aug. 25, 1924.

"Chemical Ingenuing" probes deep and true into some of the problems that face technical men as individuals, universities as teachers of those men and the industries that employ them. If it hits sensitive spots, it is because they should be hit, freed from their poison and healed clean and strong.

has been paid \$17,000, or just a trifle more than twice as much. True, at this point his earning capacity will be just approaching its halcyon era, while the postman's has reached its maximum. And, equally true, he will find the satisfaction and pleasure in his work more than adequate compensation for any difference in income. But in this materialistic world he cannot overlook, nor should he be expected to overlook, the fact that an extra eight and a half thousand dollars at 28 will go a long way toward the endowment of a "family and a flivver."

The causes of this condition in government pay are legion, but the sizes of appropriations, which are in turn dependent upon popular opinion, are of themselves sufficient explanation. The profligacy of armigerous appropriations is notorious; yet the Chemical Warfare, with its many diverse responsibilities, receives only one-quarter of 1 per cent of the army allotment, only a twentieth as much as is spent for aviation. And the Bureau of Chemistry, for carrying on its extensive research and regulatory work, is furnished just one-tenth as much as is given the Treasury for maintaining *Die Wacht am Verbot*, or the navy for scrapping worn-out ships. These proportions are representative. Yet the efficiency of government scientific work is an internationally commented actuality, the opinions of a prominent Philadelphia pharmacologist to the contrary notwithstanding. The answer is, obviously, that the workers in this field are men whose principal consideration is not financial reward.

Profanum Vulgus

And Even the Research Chemist Has a Position That Is None Too Envidable—at Times

If all these things be true, what is to become of the occasional chemist to whom a sense of work well done is a perquisite but not a plenary compensation? What of the fellow who, through predestination, or because of the influence of heredity or environment, or in contumacy of all prejudice, is plutocratically inclined? Must he renounce the faith? On the contrary; if he will go where money is to be made—to industry—he will find that a versification in atomic ledgerdom constitutes an unrivaled sumptuary touchstone. And soon or late the man with phase rule and ion tutelage must dominate those industrial processes where profitability is measured as chemical principles are suspiciously applied.

But if chemical profundity is an advantage, it is by no means the sole essential to spondulic conquest. The competition is the keenest. And, for that matter, why should industry fold its hands submissively and turn over the works to the first interloper who comes along with extravagant egotism and Midas promises? Iconoclasts have never been popular outside of romance and when the image breakers come clamoring for recognition and a cut in the gate receipts the precedent-intrenched hosts of rule of thumb exhibit an understandable reluctance to relinquish their lucrative aggrandizement.

So, discomposing as it may be to our well-ordered smugness, the chemist has advanced in the commercial squabble only in proportion as he has been able to compete in catch-as-catch-can competition with lesser, but nevertheless craftier and more experienced, peddlers. Hence it has been the production and not the

research chemist whose progress has been most rapid. Not without brilliant exceptions, the research chemist is still a luxury rather than an indispensable asset. Even in this advanced age, with Duncans and Slossons in every Babbitt's library, mash tubs in the cellar and Pasteur and Wiley rated second only to the Chamber of Commerce secretary, the research chemist is still regarded as a prize exhibit, to be bruited about in advertisements and dandled before prospective buyers during affluence and swiftly booted out a rear exit—instead of more preciously clung to—with the first hint of financial duress.

Fortunately the production chemist, while perhaps not best fitted to shine in theoretical discussions, is better suited to the commercial scramble. His accomplishments are more conspicuous and comprehensible to the uninitiate and the results more quickly translated into dividends. In addition, through his contact with the mighty intellects of business enterprise he is becoming adept in their methods and is always annexing additional territory for the clan. And as his conquest meets with more and more success, nepotism will be inevitable; this is the hope of his more profound but less bumptious brethern for saving them from their decadence.

A Priori

Just one more *Schnitzel* of Gilead and we are done: If this inadequate and unpretentious introduction should serve to incite more able inquiry, and one-tenth of the available material were disclosed, so vast and potent would be the data that with reasonable assiduousness the chemist could not avoid a plutocratic conquest of this sunkist land where the most astute prophets of Mammon spend a month and a half of the year vacationing, a week and a half of the month conventioning, a day and a half of the week golfing and an hour and a half of the day calling one another by first names and singing home-brewed nursery rhymes to the tune of "John Brown's Body."

And so we approach the age of Chemistry.

Artificial Silk Surpasses Natural Silk in Volume

World production of artificial silk in 1922 amounted to about 80,000,000 lb., indicating a remarkable growth from about 20,000,000 lb. in 1913. In volume, therefore, it now surpasses natural silk, the production of which amounted to about 70,000,000 lb. in 1922-23.

The United States is the largest producer of artificial silk, followed in 1922 by the United Kingdom, Germany, Belgium, Italy and France. The production of artificial silk in the United States since 1913 has been as follows:

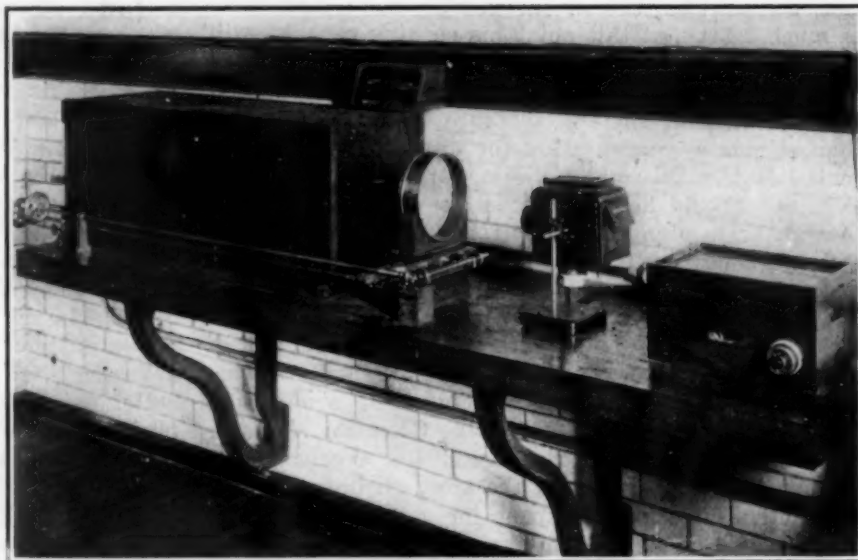
	Lb.		Lb.
1923.....	35,380,000	1917.....	6,687,000
1922.....	24,406,400	1916.....	4,744,000
1921.....	15,000,000	1915.....	4,111,000
1920.....	8,000,000	1914.....	2,445,000
1919.....	8,000,000	1913.....	1,566,000
1918.....	5,828,000		

The artificial silk production in the United States amounted to 35,380,000 lb. in 1923, as compared with the imports of natural silk amounting to 49,506,000 lb. International trade in raw silk has recently been considered in detail by L. A. Wheeler, Bureau of Foreign and Domestic Commerce, in Trade Information Bulletin 283, from which the above data were taken.

Are Your Sieves Standardized?

Perhaps It Isn't Important That They Should Be, but if Mesh and Fineness Are Important Specifications, the Bureau of Standards Can Help You

By Lewis V. Judson



TWO MILLION holes! That's the number in an 8-in. No. 200 sieve. Two million precise measuring instruments and two million possibilities of trouble for sieve cloth weavers and for the user. Yes, and two million reasons why one should purchase testing sieves with care.

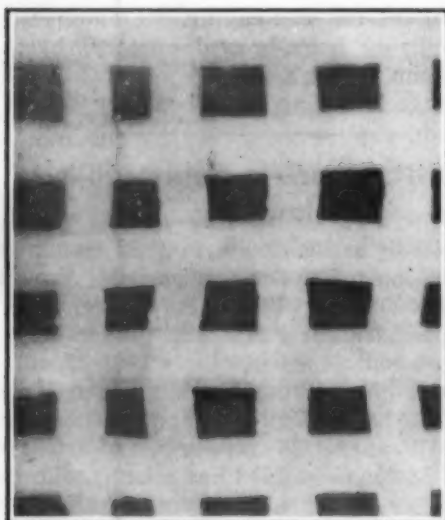
Several years ago the Bureau of Standards recognized the need for published specifications for sieves and prepared the specifications for the U. S. Standard Sieve Series. These as last revised are contained in Letter Circular 74, which may be obtained from the

Published by permission of the Director of the Bureau of Standards of the U. S. Department of Commerce.

Bureau of Standards, Washington, D. C., free upon request.

There are plenty of sieves on the market, and for some purposes almost any sieve will do which is anywhere near the dimensions given on the label. But for fineness testing one should know more about the sieves. A projection apparatus at the Bureau of Standards has enabled the inspection of sieves with speed and accuracy. Photographic equipment enables pictures of the cloth to be made and thus convincing evidence of the condition of the weaving can be submitted to manufacturer or sieve user.

There was recently tested at the bureau a piece of



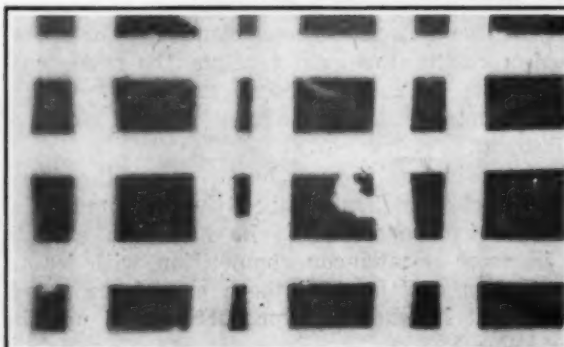
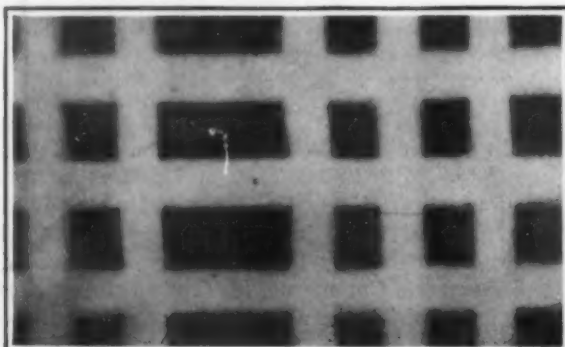
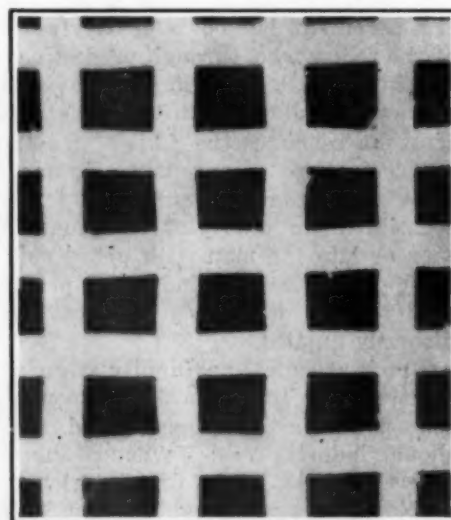
(ABOVE) The sieve-testing apparatus, substantially a projection lantern. The other photographs are typical projections.

(RIGHT) A sieve passing specifications.

(LEFT) An English sieve having large wire diameters.

(LEFT BELOW) Warp opening large and irregular.

(RIGHT BELOW) The slide is turned at 90 deg. from the others. It shows how the shoot wires are "jamming."



No. 200 cloth with irregular weave. This cloth was so woven that, on the average, the wires were as close together as is permitted in the specifications. Because of the large openings between many of the warp wires the majority of the openings in a sieve made of this cloth would be finer than allowed. The large openings were found to be much greater than is specified. As a consequence there is this peculiar condition: With material more or less spherical in shape, the effect of the small average openings and that of the very large maximum openings counterbalance and about as much material passes as through an evenly woven standard sieve. Cement was found to produce this result. But 9 per cent more of a certain sample of carborundum, having an elongated shape, passed through this same sieve than through the identical standard sieve used in the cement test.

THE SPECIFICATIONS ARE PRACTICAL

The specifications of the Bureau of Standards have been revised several times in order that they might be thoroughly practical. The records of tests at the bureau show that the production of sieves conforming to the specifications is commercially possible. At the same time it is realized that there is often difficulty in getting precision sieves. This is a serious problem and the bureau has given it much thought. Part of the difficulty lies in the fact that the defects existing in sieves have often not been realized and sieves have been ordered without regard to specifications. As a consequence sieves have been sold as precision sieves with spacing so defective that it could be found by any trained observer using only a steel scale.

Recently a large corporation desired several No. 200 sieves for some special work of considerable accuracy. Sieves were ordered of a reliable manufacturer who had just been sending in No. 200 sieves in considerable numbers and receiving certificates for practically all of them. Unfortunately fifteen of the twenty sieves ordered by this corporation were from another piece of cloth and were defective.

A WORD TO THE WISE USER

Sieves when properly made may be classified as precision instruments for the determination of the fineness of material. Users of sieves should realize that sieves will give reliable results only when they are properly made. To give one illustration, a No. 200 sieve is of little use for fineness testing if its average opening varies greatly from 0.0029 in. on a side or if some of the openings are rectangular 0.005 in. on one side. Those who have realized this requirement have co-operated well with all efforts at uniform standardization. The specifications as issued on April 15, 1924, and as proposed by Committee E-1 of the American Society for Testing Materials at the annual meeting at Atlantic City are very liberal on wire diameter and there should be no difficulty in obtaining these sieves. The nominal values of openings are almost identical with the nominal dimensions of opening for one widely advertised series of sieves and varies but little from the series of sieves of other manufacturers.

At the present time it is really a question of everybody realizing the importance of the problem and of each manufacturer making the sieves needed by the industries with an accuracy which is both necessary and attainable.

Influence of Sulphur, Oxygen, Copper and Manganese on Red-Shortness of Iron

The effects of sulphur, oxygen, copper and manganese on the red-shortness of pure iron have been investigated in a series of small experimental ingots at the Bureau of Standards. The results of this investigation, as given in Technologic Paper 261, indicate that:

1. Sulphur is the principal element responsible for red-shortness. In order to avoid red-shortness in iron not more than 0.01 per cent sulphur should be present.
2. Oxygen in amounts up to 0.20 per cent does not cause red-shortness in pure iron if the sulphur is below 0.01 per cent.
3. Manganese may prevent red-shortness in iron when present to the extent of three times the sulphur percentage, if the oxygen percentage is not above 0.04.
4. The presence of considerable amounts of oxygen in irons (0.10 per cent and above) tends to reduce the efficiency of manganese in preventing red-shortness. The hypothesis is advanced that this is because some of the manganese reported in such irons is present as oxide.
5. Copper (0.05 to 0.5 per cent) is of minor importance in its effect on red-shortness of pure iron, but in some cases it tended to decrease the red-shortness.

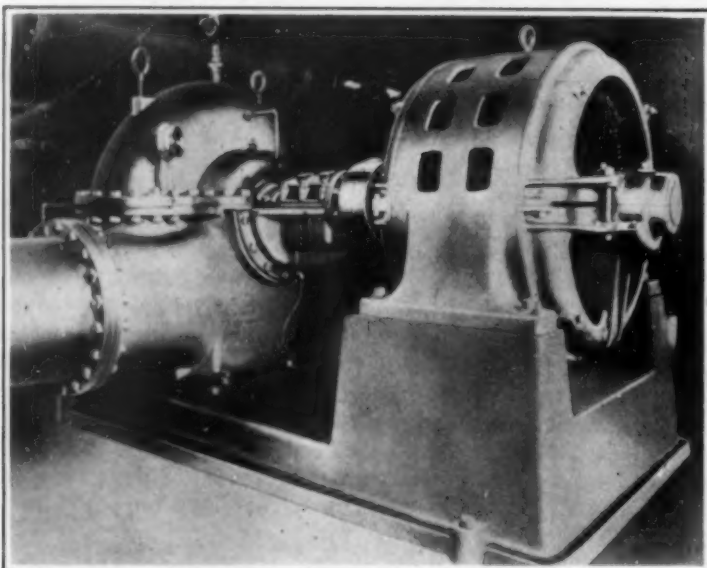
Titan Cement Affords Outlet for Titaniferous Iron Ores

According to Edwin C. Eckel, of Washington, D. C., titaniferous iron ores yield with proper treatment a slag somewhat similar to alumina cement but having certain advantages. The ore is melted in a blast furnace with sufficient limestone to give a fusible slag containing 25 to 50 per cent lime. Some of the iron separates and is tapped as in the usual practice. The slag is also removed at intervals, cooled by sprinkling and ground to a fine powder. The cement hardens, after a normal set, in 24 to 28 hours, the strength at all periods being far above that of portland cement. It has a gravity of 3.35 to 3.55 and the resistance to chemical attack is higher than that of portland or alumina cements. (Patent 1,511,323, Oct. 14, 1924.)

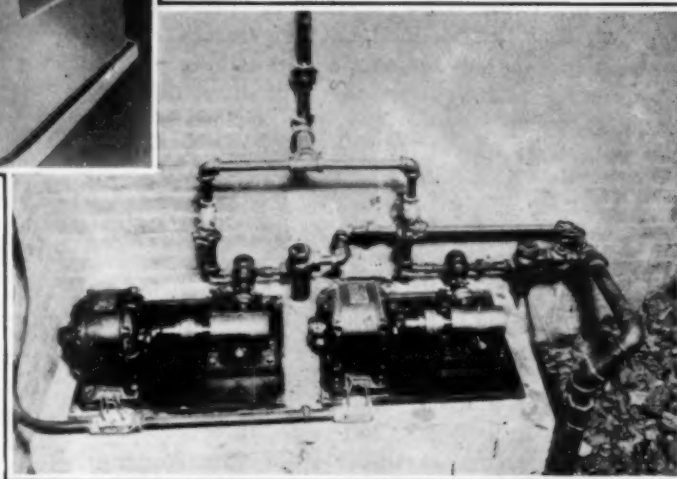
American and Foreign Clays Compared as Paper Fillers

Between 200,000 and 300,000 tons of clay is used annually as filler by the paper industry of the United States. As the larger portion of this is of foreign origin and it is believed that a more general use of domestic clays is in many cases restricted by prejudice, the Bureau of Standards has studied five American and three foreign clays comparatively with regard to physical properties and also actual behavior under paper making conditions. The results (Technologic Paper 262, by M. B. Shaw and G. W. Bicking) show that the amount of clay retained in the finished paper and the quality of the paper are in general the same for both American and foreign clays. The color and grit tests favored very slightly the foreign clays, but not sufficiently to justify consideration of these properties alone in selecting clays. Since these tests were made, samples of domestic clays as white as or whiter than the foreign clays were received for examination.

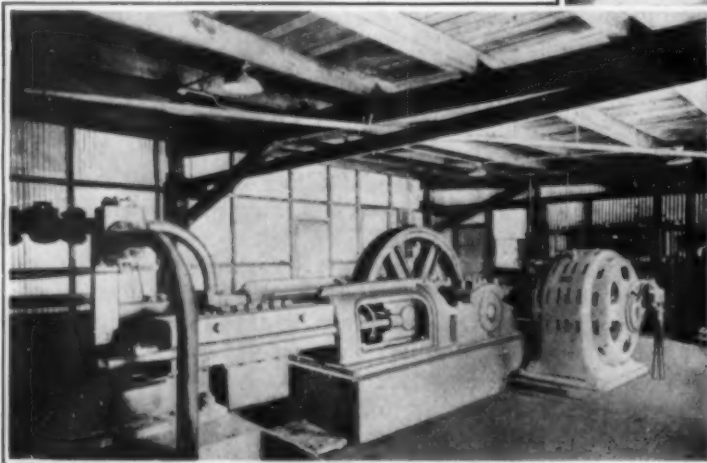
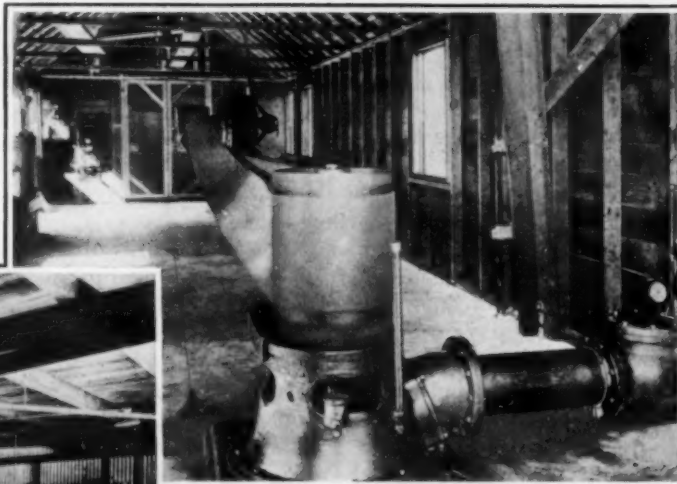
An Infinite Variety of **Pumping Equipment**



(ABOVE) Along with the use of oil for an industrial fuel has come the development of fuel pump sets such as is shown at the right. This set of two units insures service in case one pump breaks down. Drive of the small rotary pumps—which are directly in the pipe line—is through a worm and wheel, friction in this drive being overcome by the use of ball bearings.



(BELOW) Many plants must pump brine, water or other liquid from wells, and for this purpose the deep-well pump serves well. Sometimes such a pump has the motor mounted directly on the top of the shaft, while in other cases such as that illustrated in the lower picture at the right, the drive is by belt from a motor conveniently located. Modern thrust bearings make the efficient operation of such a pump possible.



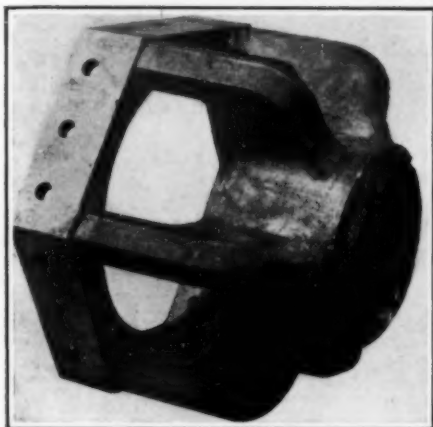
IT IS literally true that where there is industry there are pumps. Without doubt they are the most widely used of all process equipment. The types, the methods of operation, the variety of service are legion. These pictures show a few possibilities that are suggested.

(BELOW) The primary use of pumps is to pump water. The view at the left shows a modern unit for this service—a single-stage, double-suction, high-duty centrifugal pump of 15,000 gal. per minute capacity. This unit is direct-connected to its driving motor through a flexible coupling. The thrust on the pump impeller, which may be in either of two directions, is taken up in a two-way ball-thrust bearing.

(ABOVE) Various types of process equipment require pumps as accessories. Here is an interesting application of this type—a pump operating a large hydraulic press. This type of pump must stand up under extremely heavy loads and the construction necessary for such service is clear from the photograph. The drive is a 500 r.p.m., ball-bearing slip-ring motor of 300 hp., driving through gears to the pump crank shaft.

Equipment News

From Maker and User

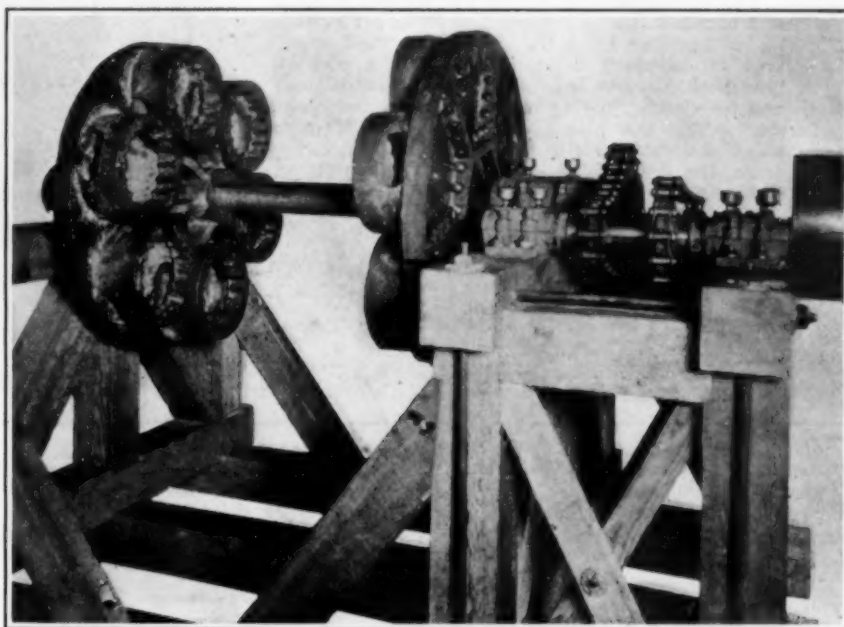


Feed Spider Casting

Mill for Wet or Dry Grinding

The mill shown in the accompanying illustrations is designed for the grinding, wet or dry, of various classes of material through a comparatively wide range of reduction, the size of product depending on the aperture of the screen used. The rods, $1\frac{1}{2}$ in. in diameter, used as grinding media are in six bunches, being supported only at the ends, thus providing a balancing feature that makes starting torque negligible. The machine is best adapted for reduction from $\frac{1}{4}$ in. to 60 mesh or finer.

No external classification is necessary, the mill discharging a screened product as soon as the predetermined size, according to screen aperture, has been reached. The material to be ground is fed in by gravity through the openings in a spider casting at each end. Discharge is peripheral, through a large area of screening.



Spiders, Rod-Holders, End Plates and Drive Assembled on Shaft

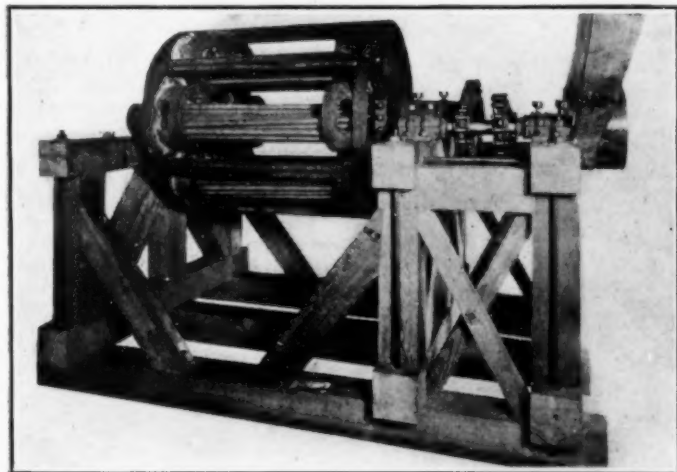
For the mill illustrated, which has a shipping weight of about 4 tons, an output of from 30 to 50 tons per day is claimed on material of ordinary rock hardness. A 3-hp. motor is recommended, the nominal input at full load being given as two-thirds of this. The machine, being self-contained and balanced, needs no heavy foundations. Total space occupied is 7 ft. x 10 ft. x 8 ft. high.

Eastern manufacturing and selling rights are held by the Tamaqua Manufacturing Works, Tamaqua, Pa. Patents have been applied for by Carl S. Willis, Glacier, Wash., the inventor, who has retained control of the exploitation of the machine in the Western states.

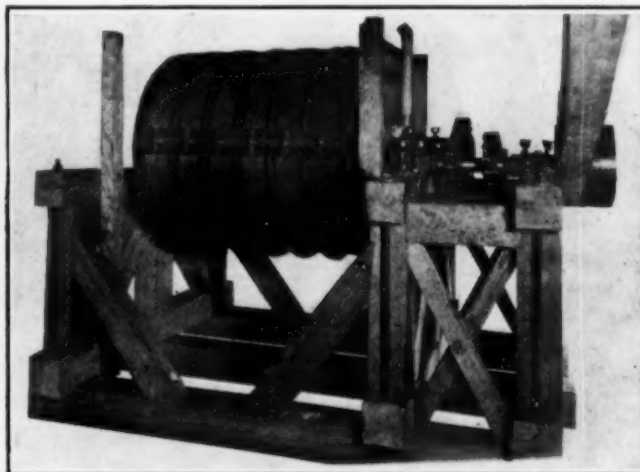
Acid-Proof Cement

An acid-proof cement called "Basolit" is being placed on the American market by the Neuhaus-Knoch Chemical Corporation, Buffalo, N. Y. It is said to be in successful use by many European chemical plants for lining iron, cement and wood tanks, for acid proofing cement floors, for joining bricks and plates and for setting bolts, hangers and anchors.

This cement is a homogeneous compound that melts with slow, moderate heat and, on hardening, is claimed to be proof against the corrosion of concentrated or dilute, hot or cold commercial acids such as sulphuric, nitric,



Grinding Rods and Screen Supports in Place



The Assembled Mill With the Screens in Position

Fig. 1—Warehouse Stacking Machine

The stacker shown here in use for piling boxes and barrels has a lifting speed of 40 ft. per minute under loads of 1,000 lb. It has a "dead man" type of controller connected through a positive link mechanism to limit stops at top and bottom and to a self-adjusting band brake on the motor shaft. The motor is $2\frac{1}{2}$ hp. and drive is through silent chain and worm and wheel to the hoisting drum, the gears being inclosed and running in an oil bath.



hydrochloric and acetic and also chlorine gas. It is also said to be water and oil proof and to stick solidly to any rough surface or smooth masonry, iron, wood, or to itself.

Stacking Equipment Developments

Stacking equipment for warehouses and similar places has been in use for several years. One of the most effective of such machines is shown in Fig. 1, where the storeroom gang of a large plant is seen placing spare parts in storage. This type of machine permits a much more economical use of space than could easily be achieved by other means, for with it goods may be stored to the room ceiling in a cheap, quick and efficient manner.

The mechanism of this type of stacker has suggested a new device that has recently been placed on the market and is shown in Fig. 2. This machine

permits the easy loading of trucks in plants that do not have a loading platform at truck floor height. Both these machines are the product of the Lewis-Shepard Co., 568 First St., Boston, Mass.

Continuous Chart Recorder

Pressure and temperature recording instruments of the strip chart type have recently been placed on the market by the American Schaeffer & Budenberg Corporation, Brooklyn, N. Y. They are designed for service in applications where a record is desired covering an extended period and where the cycles of operation are relatively short, requiring a wide, open record enabling detection and study of slight variations. These instruments are furnished for all pressures of steam, air, water and other fluids, or for temperatures up to 1,000 deg. F. The chart is 6 in. wide, with an effective width of $4\frac{1}{2}$ in., and is 90

ft. long. The clock movement moves the chart 6 in. per hour, giving approximately one week's service without changing charts. An automatic chart rewind is provided.

Manufacturers' Latest Publications

Steere Engineering Co., Detroit, Mich.—Pamphlet 271. A leaflet describing the new three-way backrun valve, a valve designed to eliminate the sticking valves that result from using soft coal as a water-gas generator fuel.

Paradon Engineering Co., 24 South Washington Place, Long Island City, N. Y.—Bulletin 12. A pamphlet describing chlorinating apparatus for industrial and sanitary use.

Crucible Steel Co. of America, New York.—A booklet describing non-corrosive and heat-resisting steels such as Rezistol, Atha's 2600, stainless steel, and stainless iron.

U. T. Hungerford Brass & Copper Co., New York.—Supplementary catalog, Vol. IV, No. 1. A 48-page catalog of various copper and brass shapes, sheets, tubes, etc., at present stocked by this concern in its country-wide chain of warehouses.

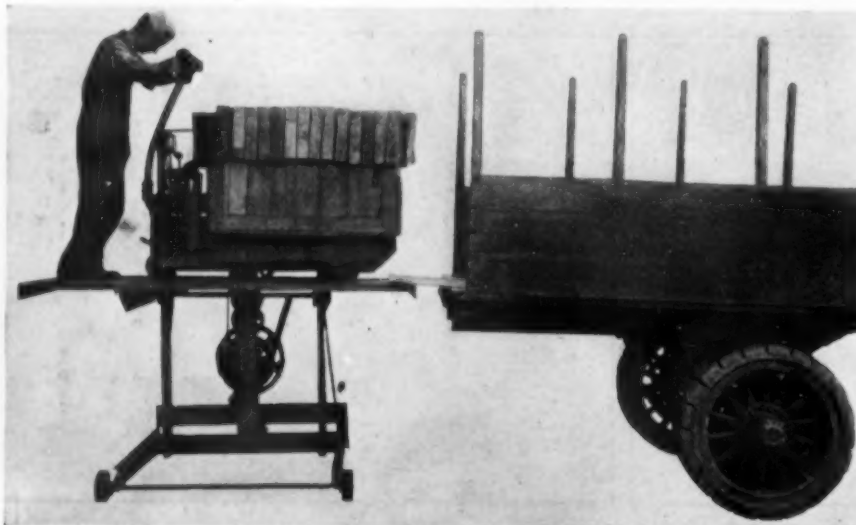


Fig. 2—Stacker for Loading Trucks

The jacklift truck and its load are backed onto the large platform of this stacker. Then the stacker is raised to the correct height and the load is placed on the truck. The platform is 84 in. long and 40 in. wide. The frame is 57 in. overall width. The overall height of the machine is 84 in.

U. S. Patents Issued Nov. 11, 1924

Bituminous Emulsion and Process of Making Same. Lester Kirschbraun, Chicago, Ill.—Re-issue 15,944.

Means for Applying Paste or the Like to Paper. Bert Selby, Indianapolis, Ind.—Re-issue 15,945.

Ventilating Paper Drying Machine. Emil A. Briner, East Orange, N. J.—1,514,600.

Manufacture of Gas Black. Edward H. Thomas, East Orange, N. J., assignor to Thomas Carbon Black Co., New Jersey.—1,514,638.

Fiber Board and Process of Manufacturing the Same. Albert L. Clapp, Danvers, Mass., assignor to Beckwith Manufacturing Co., Boston, Mass.—1,515,655.

Process of Producing Alumina, Alkali and Dicalcium Silicate. Alfred H. Cowles, Sewaren, N. J., assignor to the Electric Smelting & Aluminum Co., Sewaren.—1,514,657.

Process of Preparing Iron for Malleable Castings. Frederic T. Kennedy, River Forest, Ill.—1,514,664.

Apparatus for and Method of Mixing Plastic Materials. Joseph G. Moomy and Joseph H. Moomy, Erie, Pa., assignors of one-third to Harry E. Moomy, one-third to Mary H. Moomy, Erie, Pa., and one-third to said Joseph H. Moomy.—1,514,671.

Method of Manufacturing a Specifically Active Albumin Substance From Tubercle Bacilli for Use as a Vaccine. Erich Toennlessen, Erlangen, Germany.—1,514,681.

Method for Preventing the Turning Blue of Wood. Georg Grau and Paul B. Rother, Chemnitz, Germany.—1,514,693.

Felt-Drying Machine. Ezekiel J. Wilson, East Greenbush, N. Y., assignor to F. C. Huyck & Sons, Rensselaer, N. Y.—1,514,748.

Method and Machine for Treating Felts. Ezekiel J. Wilson, East Greenbush, N. Y., assignor to F. C. Huyck & Sons, Rensselaer, N. Y.—1,514,849.

Process and Apparatus for Canning Citrus Fruit. Eugene H. Lefevre, Avon Park, Fla., assignor to Avon Canning Co., Avon Park.—1,514,774.

Blast Furnace. Paul Otto Menke, Sharon, Pa.—1,514,776.

Food Product and Process of Making the Same. Walter S. Morton, New York, N. Y., assignor to Cheshire Kitchens, Inc., New York.—1,514,780.

Electroplating Machine. Hedley J. Richards, St. Louis, Mo., assignor to Lalsco, Inc., St. Louis.—1,514,783.

Neutral Cement. Robert H. Youngman, Pittsburgh, Pa., assignor to Harbison-Walker Refractories Co., Pittsburgh.—1,514,812.

Apparatus for Constructing Plaster Board. Charles R. Birdsey, Hinsdale, Ill., assignor to United States Gypsum Co., Chicago, Ill.—1,514,827.

Apparatus for Treating Air and Other Gases. William A. Darrah, Chicago, Ill.—1,514,835.

Method of Igniting Blast Furnaces. Frederick H. N. Gerwig, Braddock, Pa.—1,514,849.

Process of Purifying Combustible Gas. Ralph L. Brown, and William W. Odell, Pittsburgh, Pa.—1,514,889.

Electrolytic Anti-Corrosion System. Arthur Sydney Gush, Hove, England.—1,514,903.

Suction Mold. August Kadow, Toledo, O., assignor to the Libbey Glass Manufacturing Co., Toledo.—1,514,909.

Apparatus for Obtaining Improved Combustion in Furnaces. Chester A. Kellogg and Julian L. Schuele, Bartonville, Ill., assignors to Keystone Steel & Wire Co., Bartonville.—1,514,911.

Process for the Fixation of Phosphoric Acid. Bethune G. Klugh, Anniston, Ala., assignor to Federal Phosphorus Co., Birmingham, Ala.—1,514,912.

Separator. Alfred Laukhuff, Shorewood, Wis., assignor to Albert O. Trostel, Milwaukee, Wis.—1,514,915.

Electric Furnace. Charles Miller, Bridgeport, Conn., assignor to Manning, Maxwell & Moore, Inc., New York, N. Y.—1,514,918.

Apparatus for Drying Skins. Albert H. Schmidt, Detroit, Mich.—1,514,935.

Chlorinator. Charles F. Wallace, Westfield, N. J., assignor to Wallace & Tiernan Co., Inc., Belleville, N. J., New York.—1,514,939.

Control for Heating Furnaces. Andrew Wood, Cornwall-on-the-Hudson, N. Y.—1,514,946.

Pulverizing and Nebulizing Apparatus. Paolo Corti, Milan, Italy.—1,514,952.

Apparatus for Making Continuous Sheet Glass. Joseph P. Crowley, Toledo, O., assignor to Libbey-Owens Sheet Glass Co., Toledo.—1,514,953.

Filter. George D. Dickey and Harry W. Conrad, New York, N. Y.—1,514,955.

Method of Generating Ozone. Frank E. Hartman, Scottsdale, Pa., assignor to Electric Water Sterilizer & Ozone Co., Scottsdale.—1,514,964.

Process of Producing Molybdates. Alan Kissock, Los Angeles, Calif., assignor to Carl M. Loeb, New York, N. Y.—1,514,972.

Rate or Flow Controller. Chester W. Lerner, Philadelphia, Pa.—1,514,975.

Process of Making Motor Fuel. Kark P. McElroy, Washington, D. C., assignor of one-half to Alfred M. Houghton, Washington.—1,514,977.

Process for Obtaining Lithium Salts or Metallic Lithium. Everette A. Watkins, Wichita, Kan., assignor to the Watkins Manufacturing Co., Wichita.—1,515,001.

Base-Exchange Material and Process of Making Same. Abraham S. Behrman, Chicago, Ill., assignor to International Filter Co., Chicago.—1,515,007.

Sheet-Glass Drawing Furnace. Enoch T. Ferngren, Toledo, O., assignor to the Libbey-Owens Sheet Glass Co., Toledo.—1,515,021.

Electrolyte and Composition for Forming the Same. August Heck, Philadelphia, Pa.—1,515,042.

Furnace Control. Lawrence J. Hess, Youngstown, and Merrill G. Benjamin, Poland, Ohio, assignors to the Benjamin Engineering Co., Cleveland, O.—1,515,044.

Mechanical Pulp Paper Stock. Uel S. McMillan, San Francisco, Calif.—1,515,062.

Manufacture of Arsenic Acid. Vernon T. Stewart, Montclair, N. J.—1,515,079.

Method of Making Light Metal Alloys. William R. Veazey, Cleveland, O., assignor to the Dow Chemical Co., Midland, Mich.—1,515,082.

Process and Apparatus for Coating Wire and Other Drawn and Rolled Sections With Other Metals. Sherard Osborn Cowper-Coles, Sunbury-on-Thames, England.—1,515,092.

Process of Dehydrating Oil. Virgil C. Crites and Kenneth A. Wright, Los Angeles, Calif., assignors, by direct and mesne assignments, to American Oil Dehydrating Co., Los Angeles.—1,515,093.

Digester. Charles H. Gage, Columbus, O.—1,515,103.

Grain Product and Process of Manufacture. Frederick W. Graff, Chicago, Ill.—1,515,108.

Surfacing and Coloring Concrete. Robert R. Kaufman, Cleveland, O., assignor to the Master Builders Co., Cleveland.—1,515,121.

Ink. Herman Druse, Jersey City, N. J., assignor to Peerless Ink Corp.—1,515,123.

Apparatus for Molding Plastic Materials. Dirk E. Landstra, South Orange, N. J.—1,515,125.

Filter. Edwin Morrison, Denver, Colo., assignor to the Great Western Sugar Co., Denver.—1,515,130.

Apparatus for Removing Oven Doors. Julius Becker, Syracuse, N. Y., assignor to Semet-Solvay Co., Solvay, N. Y.—1,515,139.

Process for the Elimination of Aluminum and Metals of the Iron Group From Zinc, Zinc Alloys, etc. Karl Bornemann, Breslau, Germany, assignor of one-half to Erich A. Beck, New York, N. Y.; Martha Bornemann, administratrix of said Karl Bornemann, deceased.—1,515,140.

Process of Casting With Plastic Materials. Lloyd G. Copeman, Flint, Mich.—1,515,150.

Means for the Manufacture of Glass in Continuous Sheets. Eugene Rowart, Auvelais, Belgium.—1,515,174.

Mothproofing Fabrics. Samuel A. Turner, Brooklyn, N. Y., assignor to Pathe Chemical Co., Brooklyn.—1,515,182.

Reduction Furnace. Leonard Waldo, Plainfield, N. J.—1,515,185.

Measuring Device for Carbon in Steel. Trygve D. Yensen, East Pittsburgh, Pa., assignor to Westinghouse Electric & Manufacturing Co.—1,515,237.

Method of Producing Chilled-Iron Alloy Castings. John N. Early, Pittsburgh, Pa., assignor to W. J. Early Sons Foundry Corp., Pittsburgh.—1,515,244.

Recovery of Vanadium. Albert N. Erickson, Elmhurst, N. Y., assignor, by mesne assignments, to Electro Metallurgical Co., New York, N. Y.—1,515,245.

Process and Apparatus for Catalytic Oxidation. Charles R. Downs and Charles G. Stupp, Cliffside, N. J., assignors to The Barrett Co., New Jersey.—1,515,299.

Process of Producing Resin. Alfred E. Roberts, Cornwells Heights, Pa., assignor to The Barrett Co., New Jersey.—1,515,315.

Process of Producing Anthraquinone. George C. Bailey, Woodcliff-on-Hudson, N. J., assignor to The Barrett Co., New Jersey.—1,515,325.

Method of Making Carbon Black. Alexander Bonnington, South Charleston, W. Va., assignor to William H. Davis, Charleston, W. Va.—1,515,333.

Deodorant and Insecticide, Parantiochlorobenzene. Ruric Creegan Roark, Baltimore, Md.—1,515,364.

Enameling Furnace. Albert F. H. Seelig, St. Louis, Mo.—1,515,368.

Furnace Lining and Method of Making the Same. Frank J. Tone, Niagara Falls, N. Y., assignor to the Carborundum Co., Niagara Falls.—1,515,375.

Beating or Comminuting or Pulping Machinery for Paper Making. Herman Arledter, Tunbridge Wells, England.—1,515,423.

Method and Apparatus for the Manufacture of Glass Plates. Frank L. O. Wadsworth, Pittsburgh, Pa.—1,515,450.

Construction of Open-Hearth-Furnace Ports. George L. Danforth, Jr., Chicago, Ill.—1,515,462.

Alloy. Charles Dietz, York, Pa., assignor to the Dentists Supply Co., New York.—1,515,464.

Sugar-Refining Device. Pascual Hernandez, Camaguey, Cuba.—1,515,481.

Regulating Device for Electric Furnaces. James Kelleher, Goderich, Ontario, Canada.—1,515,492.

Process of Preparing Mercury Salts of Complex Organic Bismuth Acids. Wilhelm Kolle, Hugo Bauer and Ernst Maschmann, Frankfurt-on-the-Main, Germany, assignors to Farbwerke vorm. Meister Lucius & Brüning, Höchst-on-the-Main, Germany.—1,515,495.

Electrically-Heated Furnace or Leer. Edwin E. Milner, Scott Township, Allegheny Co., Pa., assignor to H. L. Dixon Co., Carnegie, Pa.—1,515,511.

Still Scraper. Ethurge Cravens, West Tulsa, Okla.—1,515,552.

Manufacture of Artificial Silk and the Like. William Porter Dreaper, London, England.—1,515,556.

Coming Society Meetings at New York Chemists Club

The schedule of society meetings at the Chemists Club, New York City, for the remainder of the season 1924-25 is as follows:

Dec. 5, Society of Chemical Industry, Grasselli medal; Dec. 12, American Chemical Society, regular meeting; Jan. 9, American Chemical Society, regular meeting; Jan. 16, Society of Chemical Industry, Perkin medal; Feb. 6, American Electrochemical Society (in charge), joint meeting with the Society of Chemical Industry, Société de Chimie Industrielle and American Chemical Society; March 6, American Chemical Society, Nichols medal; March 20, Society of Chemical Industry, regular meeting; April 17, Society of Chemical Industry (in charge), joint meeting with the American Chemical Society, American Electrochemical Society and Société de Chimie Industrielle; May 1, American Chemical Society, regular meeting; May 8, Société de Chimie Industrielle (in charge), joint meeting with the American Chemical Society, American Electrochemical Society and Society of Chemical Industry; May 15, Society of Chemical Industry, regular meeting; June 5, American Chemical Society, regular meeting.

News of the Industry

Summary of the Week

First complete list of licencees of Casale synthetic ammonia process made public.

Tonnage purchases of carbon tetrachloride for German account made in this country.

Award of Chandler medal to Prof. E. C. Kendall of the University of Minnesota is announced.

Official proclamation makes diethyl-barbituric salts dutiable on basis of American sales prices.

American Engineering Council advocates higher salaries for federal judges.

No solution of Muscle Shoals problem seen at coming session of Congress.

Bureau of Chemistry announces discovery of new fumigant to destroy weevils in wheat.

Third Annual Power Show to open in New York City next Monday.

American Price Basis for Duty on Diethyl-Barbituric Salts

Acting upon the unanimous report of the Tariff Commission, President Coolidge has issued a proclamation under the terms of the flexible tariff ordering that imports of diethyl-barbituric acid, and salts and compounds thereof, be assessed for duty on the basis of American selling price instead of foreign market value. The duty is 25 per cent ad valorem, under paragraph 5 of the 1922 tariff act. The change will mean an increase of practically 100 per cent in the duty. The commission reported that an increase of 50 per cent would not be sufficient to equalize costs of production here and in Switzerland, the principal competing country, and recommended a transfer to American valuation. This is the first case under the flexible tariff that such a transfer has been made. The duty is to be assessed according to the American selling price of barbital and not upon the price of veronal, because the latter ordinarily commands a higher price.

Carbon Tetrachloride Purchased Here for German Account

Tonnage purchases of carbon tetrachloride for German account are being made in this country. This movement follows efforts on the part of the Chemical Division of the Department of Commerce to point out to German consumers that we are in a better position to supply certain requirements for this product on a more advantageous basis than they can produce it.

Germans Substitute Iron Salts for Chrome in Tanning

Trade Commissioner William T. Daugherty, Berlin, has submitted a translation of an article that appeared in *Häute und Leder*, Berlin, Oct. 13, regarding a new process for tanning in

which iron salts are employed in place of chrome. Copies of the translation are available at the Chemical Division of the Department of Foreign and Domestic Commerce at Washington.

Chandler Medal to Be Bestowed on Prof. E. C. Kendall

Award of the Chandler medal, bestowed annually by Columbia University for services to science, to Prof. E. C. Kendall, in charge of the chemical division of the Mayo Foundation of the University of Minnesota, is announced.

Prof. Kendall will formally receive the honor at a meeting to be held at the university in February, when he will deliver the Chandler lecture. He was born in Norwalk, Conn., March 8, 1886, receiving the degree of B.S. in chemistry from Columbia in 1908, A.M. in 1909 and Ph.D. in 1910.

As research chemist he conducted investigations of the thyroid in Detroit and later at St. Luke's Hospital, New York. Since 1911 he has been associated with the Mayo Clinic and the Mayo Foundation. Professor Kendall succeeded in isolating the active constituent of the thyroid. He has been a contributor to the *Journal of the American Chemical Society*, of which he is a member, and to other scientific publications.

The Chandler medal was established in 1910 by friends of Charles F. Chandler, now professor emeritus at Columbia and for more than half a century an outstanding figure in chemical science. Professor Chandler was one of the founders of the American Chemical Society.

Others who have received the Chandler medal include Dr. L. H. Baekeland, of New York, now president of the American Chemical Society; Dr. W. F. Hillebrand, U. S. Bureau of Standards; Dr. W. R. Whitney, Schenectady, N. Y.; Dr. F. Gowland Hopkins, and Dr. Edgar F. Smith, provost emeritus of the University of Pennsylvania.

New Fumigant Found to Destroy Weevils in Wheat

Four volumes of ethyl acetate with six volumes of carbon tetrachloride has been found by the Bureau of Chemistry to be an ideal fumigant for the destruction of weevils in wheat. It is non-flammable and non-explosive and leaves no objectionable odor in the flour or other products made from the grain.

The new fumigant was discovered as the result of an extensive research to find something to take the place of the highly flammable and explosive carbon bisulphide that was used extensively for fumigating grain but the use of which in fumigating box cars loaded with grain has been prohibited by nearly all the railroads in the country, except at a few isolated points, because of the danger of fire and explosion.

Tests were made of more than 100 organic compounds and various combinations of these upon three species of grain weevils and the Indian meal moth, before discovery of a suitable fumigant that was non-explosive, non-flammable and without injurious action on the grain or the products manufactured from the grain. This new mixture kills practically 100 per cent of weevils in wheat loaded in box cars, when used at the rate of not less than 40 lb. per 1,000 cu.ft. of air space. At present prices the mixture costs 10 cents a pound. Figuring the average box car to have a capacity of 2,750 cu.ft. and to be loaded with 1,300 bu. of wheat, the cost of fumigating will be less than one cent a bushel, or to be exact, 85 cents per 100 bu.

Since the old carbon bisulphide method, because of the danger of explosion or fire, has been outlawed by the railroads, except at two terminals, and allowed there only temporarily as an emergency measure, it is apparent that but for the discovery of a safe effective method for fumigating, the practice of fumigating in cars would soon have been discontinued.

News in Brief

Colors Presented to Twenty-seventh Engineers—The colors of the Twenty-seventh Engineers were turned over to the United Engineering Society by the State of New York at a ceremony in the Engineering Societies Building, 29 West 39th St., New York City, Friday evening, Nov. 14. The Twenty-seventh was the only regiment in the A.E.F. composed exclusively of mining engineers, its officers being drawn from the Institute of Mining and Metallurgical Engineers.

Ottawa May Have National Research Laboratory—At a recent meeting of the Industrial Research Council of Canada, held in Ottawa, the question of a national research laboratory at Ottawa was discussed, and the announcement made that some action would be taken at the coming session of Parliament toward securing a grant for that purpose. This is held to be most essential to the work of the council. During the session of 1921 a bill providing for such an institution was passed by the Commons, but was rejected by the Senate.

"One-Piece" Tankship Built—The first vessel ever built in the United States by the electric welding method is ready for launching in Providence, R. I. The "one-piece" vessel is 80 ft. long, 26 ft. beam and the hull is 12 ft. deep. The tanks in the hold have a capacity of 200,000 gal. The boat will be used by the Pennsylvania Petroleum Products Co. in its tanker service.

Columbia Breaks Ground for New Chemistry Building—Ground was broken last week at Columbia University for a new chemistry building to cost \$900,000, and a new physics building to cost \$1,250,000, both of which are expected to be ready for the opening of the academic year next fall. The chemistry building will be nine stories high.

German Nitric Acid Reaches French Markets—Acting Commercial Attaché J. F. Butler reports from Paris that French producers of nitric acid are reported to be disturbed with regard to the imports of synthetic nitric acid from Germany, sales of which are being made notwithstanding the 26 per cent import tax.

Receivers Ask Court Permission to Sell Butterworth-Judson Corporation—Acting on a petition made by the receivers, the Federal District Court of New York has issued an order to the Butterworth-Judson Corporation and to the creditors to show cause on Nov. 25 why the petition of the receivers for the corporation recommending the sale of the properties should not be granted. The corporation, which has been prominent for many years in the manufacture of acids and heavy chemicals, has been operating under a receivership since early in 1922.

Development in Utilization of Wood Products

Various Woods to Be Used in Manufacture of Paper, Particularly in the South

Supplementing the statements made previously as to the possibilities of newsprint paper production from Southern woods, C. P. Winslow, the director of the Forest Products Laboratory at Madison, Wis., declared at the conference on utilization of forest products that this development promises "to spread the burden of newsprint supply over a large number of woods and over new regions, particularly the South."

While Mr. Winslow was careful to point out that the commercial feasibility of the new chemical process devised at Madison has not been entirely established, it was apparent that he entertains no doubt as to the ultimate working out of the commercial problems. "After 2 years of experimentation," Mr. Winslow continued, "we have been able at the Madison laboratory to utilize black gum, cotton wood and other Southern hard woods by applying a new chemical process that gives a yield of paper equivalent to 80 per cent of the weight of the wood. This is as high a yield as is obtained in the usual processes of making newsprint which are adaptable only to spruce and a very few other soft woods. There are now in the South large stands of second growth hard woods not now used to any great extent as lumber or for other purposes. These species have a fairly rapid growth, so that a continuous supply is promised the pulp mills that establish themselves in the new region. Both because its climate is the most favorable to forest growth and because it is advantageously located with respect to many paper consuming centers, the Southern hard wood region is well suited to become a permanent source of pulp wood."

Newsprint Paper From Black Gum

That the experiment is in its final stages was indicated at the conference by the fact that the program was printed on newsprint paper made entirely from black gum. Nine-tenths of a cord of black gum produces a ton of the new paper, as compared with 1.2 cords of spruce required to produce a ton of newsprint by the usual processes. It also was pointed out that the high yield and the excellent natural color of the pulp give promise that such broadleaf woods as aspen, birch, beech, maple, tupelo gum, cotton wood and poplar may be used profitably for this purpose. Since many of the broadleaf woods have limited uses as lumber, their utilization for pulp was hailed at the conference as one of the most important of the ways in which timber supply could be conserved.

A. C. Goodyear, president of the Great Southern Lumber Co., told how his company, which manufactures 1,500,000 ft. of lumber per day, was able to utilize all of the tree with profit to itself. One of the points he stressed was the recovery of all possible turpentine. It is the practice of his com-

pany to turpentine the trees 2 years before they are cut. Then as the lumber goes through the dry kilns the remaining turpentine is extracted by a steam process. His company now is preparing to extract the turpentine from even the chips before they go to the pulp mill. In the early days of the company's operation he told of employing the best chemists available to make a study of the possibilities of developing byproducts. The chemists submitted 811 pages of reports. As a result the company embarked in the manufacture of kraft pulp and paper and of container board. Greatly increased quantities of turpentine were obtained. Charcoal was manufactured on a considerable scale. So many uses were found for the wood that previously had to be burned up in an expensive waste burner that the use of that facility has been dispensed with.

Franco-German Negotiations Carried On in Secret

Negotiations are progressing in the drafting of the Franco-German commercial treaty, but no indication that phosphates are under discussion has been forthcoming. The treaty is being drafted behind closed doors and very little information is being given out as to the matters under discussion. In view of the closeness with which the matter is being followed, however, it is believed that any consideration of the phosphate matter would become known.

Germany is negotiating other commercial treaties, in all of which she is insisting on a "most favored nation clause." Were French phosphates to be given a preference, this would let down the bars for demands for a similar favor from any other country. The best thought of those on the ground is that Germany will not tie her hands in this manner.

Rubber Products Specifications Ready for Distribution

The U. S. Government master specifications have been adopted by the Federal Specifications Board for a large number of rubber products purchased by various federal departments. These specifications range from No. 215 to No. 237 inclusive; the subjects include rubber aprons, ice bags, bandages, rubber cement, sheeting and a wide variety of rubber products used in hospital and medical work. Copies of the specifications are available from the office of the Federal Specifications Board, care of Bureau of Standards, Washington.

Thirteenth Supplemental List of Dye Standards

The Treasury Department has issued its thirteenth supplemental list of standards of strength of coal-tar dyes for the purpose of assessing the specific duty of 7c. per pound, which is applied according to the proportion the strength of the importation bears to the strength of similar imports prior to July 1, 1914. This list adds fifteen dyes to the standards and names seven others for similitude to dyes previously included as standards.

Washington News

No Muscle Shoals Solution in Short Session

Congress Likely to Leave the Matter Largely in the Hands of Secretary of War

On the eve of the convening of Congress for its short session there is very general agreement that no Muscle Shoals policy will be agreed upon prior to March 4. Congress will have about all it can do to get through the necessary appropriation bills, while a portion of the time must be given to the formulation of legislation of basic importance to agriculture.

A definite priority has been given to the disposition of the Muscle Shoals matter, but the only chance for final action would lie in the ability of all concerned to agree on a plan. Such unanimous consent is manifestly impossible, when consideration is given the sharp differences of opinion held by various groups, each wielding a very considerable political influence. The Tennessee Valley Improvement Association will bring forward its own plan, even if it should be convinced that Mr. Ford would not accept the project, although it were tendered him under the offer he has withdrawn. It may be mentioned in passing that no one in Washington expects Mr. Ford to figure further in these negotiations, despite the fact that he left the door open in withdrawing his offer.

Various Groups Interested

Another group is composed of Senator Norris and those who would install the government in business on a large scale at Muscle Shoals. That group will not abandon passively a principle in which it firmly believes. Then there is the American Farm Bureau Federation with still different ideas as to how the matter should be settled. Another group, formed around Representative McKenzie, is bent on putting through a great experiment in fertilizer manufacture. Others have little desire to see Uncle Sam undertake the manufacture and distribution of fertilizers. They want to see the power made available for public utility use.

With these marked and stoutly held differences it can be seen that little chance exists to thresh out this matter at a session when every hour is precious.

About as far as Congress is expected to get is to provide for further study of the Muscle Shoals problem. This apparently would leave the project largely in the hands of the Secretary of War, who has announced that he will have no hesitancy, as legal custodian of the property, in applying a business-like policy to its temporary disposition. This probably will mean the sale of such power as can be carried away from Muscle Shoals. This involves, however, the construction of a high tension sub-station and the installation of more transmission line capacity. Since there will be no mar-

ket for power at Muscle Shoals in June, when the plant will be ready for operation, it is apparent that the power must be fed into existing distribution systems. Rather than lose an income of many thousands of dollars a day, which can readily be secured for the power, it is assumed that the Secretary of War will feel free to put in the necessary transforming station.

Only Limited Power Rights Possible

The Alabama Power Co., which owns the only existing transmission line and the right of way which it occupies, might hesitate before incurring the expense of increasing its transmission line capacity. In making temporary disposition of the power the War Department could make only very limited commitments. The lease for the steam plant at Sheffield is on a 30-day basis. When hydro-power becomes available, the steam plant lease naturally will be terminated. It is recognized as a possibility that the Alabama Power Co. would be willing to supplement its 30,000-kw. transmission line with additional facilities, but even were the Alabama Public Service Commission to relent and grant a certificate of convenience and necessity for the purpose, the company likely would not feel justified in putting up more than make-shift construction until it could have some assurance of permanency in its arrangement for power. Were make-shift arrangements made to transmit as much as 100,000 kw., it would involve great waste, a burden that must be borne ultimately by the consumers of the electricity. It is thought the Alabama Power Co. would be in a position to rig up some sort of additional transmission line capacity without having to undertake special financing for the project.

Bureau of Standards Issues Annual Report

Scientific investigations and tests resulting in large savings to the government and to American industry through improvement in processes and the fixing of uniform standards are featured in the annual report of Dr. George K. Burgess, director of the Bureau of Standards.

Investigations made during the year with orifice meters for measuring gas, corrosion of underground pipes, and tests conducted covering impact stresses in highway bridges, braking systems for automobiles, and other studies have resulted in the application of improved methods in engineering practices that are of direct and substantial saving to the industrial public, Dr. Burgess states.

Other contributions to the public interest enumerated in the report are the successful development of methods of reducing the loss in the baking of Japan ware, the assistance rendered the optical glass industry in the United States, the progress made in the bet-

ter utilization of cotton linters and other cotton wastes, and the development of a method for reclamation of gasoline from dry-cleaning processes.

An increase of more than 125 times its initial volume has taken place in the testing work of the Bureau of Standards during the 23 years of its existence, the report states. During the year just closed 135,852 tests were conducted by all divisions of the bureau, as compared with 115,729 in 1923.

Revision of Import and Export Statistics on Chemicals

The Chemical Division, in conjunction with the Division of Statistics, is considering revising the classification of the chemical commodities which are now listed in the official tabulation of export and import statistics. These statistics are published annually in "Foreign Commerce and Navigation of the United States," and an effort is now being made to eliminate such items as are not entering into foreign trade in sufficient volume to warrant inclusion in the above-mentioned publication, and further to elaborate on the schedule and to segregate and separately mention other items which should appear but which are now included in unenumerated basket clauses.

As an example, it is thought that "toluol" might be eliminated inasmuch as during the year 1922 but 180 lb., valued at \$24, was exported. On the other hand, the heading "Other Medicinal and Pharmaceutical Preparations" shows exports of over 30,000,000 lb., valued at more than \$13,500,000, for the calendar year 1922.

This whole subject is rather a difficult one, and is a problem which can never be definitely settled because the department strives to publish the import and export statistics on such commodities as happen to be important in our foreign trade at the time. There must be constant revision.

The bureau would, therefore, welcome any suggestions which the chemical industry might care to offer that might be used by the department for its better guidance in this instance.

Phosphorus Plant to Operate in Norway

In a report from Copenhagen, Acting Commercial Attaché H. Sorsensen states that during and immediately following the World War a considerable number of factories came into being in Frederikstad, Norway, and the immediate vicinity. Practically all of these war plants later went into bankruptcy. One of these plants is now to be reconstructed for the manufacture of phosphorus. At the present time the only factory of this kind in Scandinavia is that at Falun, Sweden. The plant which is planned at Frederikstad will, it is estimated, be in position to supply all the phosphorus required by the Norwegian match industry. As yet no announcement has been made regarding the amount of capital of the new factory, but it is said to be over a million crowns.

Power Show to Open in New York Next Monday

The Third National Exposition of Power and Mechanical Engineering will open at 2 p.m. on Monday, Dec. 1, in the Grand Central Palace, New York City. On the following days of the week the exposition will open at noon and will close each day at 10:30 p.m. The fundamental purpose of the exposition is to bring together exhibits of manufacturers of power apparatus and mechanical equipment, so that engineers, executives and educators may have an opportunity for studying the newest developments in the entire field of mechanical engineering.

The manner in which valve manufacturers are solving the problem of high temperatures in the power plant will be thoroughly revealed in the many exhibits of equipment designed for harsh conditions of high-temperature service. In the exhibit of valves the manufacturer will show globe valves for pressures up to 500 lb. with the flanges as a part of the original body flanging. Motor controls will be shown in operation.

The power plant engineer will also have a valuable opportunity to view the many types of accessories that are of fundamental importance in power plant operation. These include pump governors, reducing valves, water regulators, damper regulators, steam traps and other automatic devices.

Devices for measuring the flow of fluids and gases and for measuring and regulating temperatures have always made up one of the most interesting sections of the show. At the coming exhibition among the novelties will be a new type of mercury column vacuum gage designed to read vacuums to the thousandth of an inch, an electric CO₂ motor, a gas pyrometer, an instrument which signals by color lights when the CO₂ per cent goes below a certain point.

Lehigh Valley Section, A.C.S., Elects Officers

Members of the Lehigh Valley Section of the American Chemical Society gathered in monthly session in the laboratory of Lehigh University, on the evening of Nov. 14. The speakers were H. A. Nelson, W. A. McKim, William H. Finkeldey and W. M. Pierce. Messrs. Nelson and McKim discussed "Paints, Varnishes and Lacquers," and Messrs. Finkeldey and Pierce spoke on "Zinc Protective Coatings."

Results of tests made on the effect of heat, light and water on paints, etc., were shown. In the case of zinc coatings, particular stress was laid on the fact that the life of a galvanized object is determined by the thickness of the zinc layer. An interesting discussion followed the main lectures.

Officers were elected for the coming year as follows: J. S. Long, chairman; George C. Beck, vice-chairman; D. S. Chamberlain, secretary, and A. A. Diefenderfer, counsellor.

The next meeting will be on Dec. 12.

Higher Pay Advocated for Federal Judges

The American Engineering Council Purposes to Get Behind Bills to Raise Salaries

Low pay is forcing federal judges from the bench, though the cost to each citizen of all the United States courts in a single year is little more than 13 cents, it is declared by the American Engineering Council in announcing its purpose to remedy what it calls a misfortune.

The engineering profession, according to a statement by the president of the Council, ex-Governor James Hartness of Vermont, will co-operate actively during the coming year in a plan of Patent Office reform.

"As the federal courts," said Mr. Hartness, "have sole jurisdiction of patents for inventions and of registrations for trademarks, the efficiency and welfare of these courts are of vital importance to the successful and beneficial administration of our patent system and federal trademark laws, and the question whether the salaries of the judges of those courts are adequate is one with which engineers are therefore directly concerned."

Best Judges Resigning

"For many years the salaries of the federal judges have been too low either to be fair to them or to be wise from the standpoint of efficiency of our federal courts. But the rise of the cost of living has now made it almost impossible for many of the judges to live upon their salaries, and some of the best judges have been forced to resign, while others are seriously considering doing so. This is particularly true of the judges in the more populous districts, where not only is the cost of living higher than in less populous districts, but the financial returns from private practice are so much higher as to make work upon the bench a greater sacrifice than elsewhere."

The American Engineering Council, Mr. Hartness announced, has adopted a resolution authorizing its officers to advocate in Congress the bills of Representative Graham and Senator Reed of Pennsylvania providing increased salaries for federal judges.

The Council, Mr. Hartness explained, acted upon the recommendations of its patents committee, of which E. J. Prindle of New York is chairman. The action, he said, has the approval of the American Bar Association, the National Association of Manufacturers, and the committee of five of the New York Patent Law Association. National and local engineering societies throughout the country composing the Council's membership will work for the proposed legislation.

President Hartness has designated Executive Secretary L. W. Wallace to represent the Council on a commission appointed by Secretary Work to make a study of the Patent Office. Mr. Prindle represents the National Association of Manufacturers.

The Council's committee reported that the Patent Office is now in much better condition as to personnel, phys-

ical equipment and amount of work in arrears than for some years past. It has been given sixty rooms in the Land Office Building and will have ten additional rooms soon. This increase of 27,000 sq.ft. of floor space has permitted a reorganization of the Patent Office, making it possible to house the hundred additional examiners provided by Congress and to group the various related divisions. All of the chemical divisions have been placed together. The electrical divisions have been grouped together in the Land Office Building.

The number of cases in arrears have been decreased by 16,000 during the year. On an average the divisions are now only 3 months behind. The trademark and design divisions are behind about 30 days. Although there has been a betterment of conditions, the committee finds that more earnest study and effort are required.

Processes Sought to Utilize the Lower Grade Iron Ores

In an effort to be prepared for the day when it will be necessary to resort to lower grade iron ores, the Bureau of Mines is attempting to devise metallurgical processes that will utilize these leaner ores. The application of magnetic concentration to deposits not now being treated by that agency is being studied intensively. Alteration of the magnetic susceptibility of the iron minerals is receiving attention, as are processes for increasing or modifying the characteristic susceptibility of components of the ores capable of being rendered separable. Magnetic concentration, agglomeration, the use of jigs and tables, and the more common concentrating methods, promise important economies by subjecting the low-grade ores to preparatory treatment, thereby reducing the burden on blast furnaces.

Washington Chemists Elect Officers

On Nov. 13 the Chemical Society of Washington elected its officers for the coming calendar year. Those named were: President, L. H. Adams, Geophysical Laboratory; secretary, R. Gilchrist, Bureau of Standards; treasurer, H. D. Houghton, Hygienic Laboratory; councilors, F. G. Cottrell, W. M. Clark, S. C. Lind, R. S. McBride; executive committeemen, William Blum, V. K. Chesnut, R. B. Sosman, M. X. Sullivan, E. W. Washburn and E. T. Wherry.

Dr. Baekeland Addresses Kansas City Section, A.C.S.

On Wednesday evening, Nov. 12, the Kansas City Section of the American Chemical Society entertained Dr. L. H. Baekeland, president of the society. Doctor Baekeland spoke on "Misdirected Energy." A number of other visitors of prominence included Colonel Walker, formerly of the Chemical Warfare Service; Dr. Herman Schlundt, of the University of Missouri, and Mr. Williams, who gave a talk in the interest of the national chemical essay contest.

Trade Associations

The Salesmen's Association of the American Chemical Industry will meet this evening at the Builders Exchange, 34 West 33d St., New York. Dinner is scheduled for 6.30, after which the regular business meeting will be held. The principal speaker will be Dr. F. E. Breithut, who will talk on the subject of "What Ails the American Chemical Industry."

The annual frolic of the Druachem Club of New York was held on Monday evening, Nov. 17, at the Waldorf-Astoria Hotel. About 250 members and guests attended.

The regular November meeting of the Paint, Oil & Varnish Club of New York was held at the Biltmore Hotel on Thursday evening, Nov. 13. Charles J. Roh, the newly elected president, was in charge of the meeting. Dr. Maximilian Toch, who recently returned from an extended trip to the Far East, was the principal speaker and gave a highly instructive talk on china wood oil.

On Thursday evening, Nov. 13, the regular quarterly meeting of the Oil Trades Association was held at the Waldorf-Astoria Hotel. Dinner was served at 7, and was followed by a business session.

Scientific Apparatus Makers Meet in Rochester

The Association of Scientific Apparatus Makers of the United States of America met on Friday and Saturday, Nov. 14 and 15, at the plant of the Taylor Instrument Companies, Rochester, N. Y. After a luncheon, a trip through the plant and an informal "get together," papers were read, followed by discussions. The program was as follows:

"A Word of Welcome," by James Ely, vice-president Taylor Instrument Companies; "A Brief Outline of the Development of the Taylor Instrument Companies," by Herbert J. Winn, president; "The Factory Organization," by P. R. Jameson, factory superintendent; "How We Handle Our Orders," by F. K. Taylor, manager industrial sales; "The Function of the Sales Engineering Department," by L. B. Swift, manager sales engineering; "The Technical Department," by H. Y. Norwood, manager technical department; "Advertising," by F. M. Herrick, manager advertising department; "Reclamation and Disposal of Obsolete Material and Product," by H. J. Noble, special accountant; "The Change in the Resistance of Carbon and Graphite From -192 Deg. C. to 2,000 Deg. C.," by Bradford Noyes; "Change Orders," by H. Brainard Brown, assistant manager technical department; "Industrial Relations Activities of the Taylor Instrument Companies," by W. F. Johnson, manager industrial relations.

On Saturday the members were taken through the research department of the Eastman Kodak Co.

First Complete List of Licensees of Casale Ammonia Process

Production of synthetic ammonia by the Casale process is now being conducted successfully in numerous plants and in many countries. The utilization of this process received great impetus by the recent action of the French Government in deciding in its favor after having actually paid 5,000,000 francs for Haber-Bosch rights and after having determined to build half of its Toulouse plant equipped for another process.

A. A. Osborne, the assistant commercial attaché at Rome, in a special report to the Chemical Division of the Department of Commerce, has obtained what is thought to be the first complete list of the licensees of this process. His list, however, is not complete as to sub-licensees.

In addition to the license held by the Ministry of War for the 20-ton plant at Toulouse, other licenses have been extended in France as follows: Cie. de Produits Chimiques & Electrometallurgiques Alais Froges & Camargue, two 1-ton units being operated at St. Aubun; Cie. des Mines de Dourdes, with two 7.5-ton units in construction; Société des Mines de Lens, with three 7.5-ton units in construction; Cie. des Mines de Vicoigne Noeux et drocourt, with two 7.5-ton units under construction; Cie. des Produits Chimiques de Roche la Molière, with two 7.5-ton units under construction; Cie. des Mines de Sarre et Moselle, with two 7.5-ton units under contract.

Rights in Japan

Rights in Japan have been secured by the Japan Nitrogen Fertilizer Co. of Osaka. It is operating four 7.5-ton units at Nobeoka and estimates have been requested for three 15-ton units. In Spain the licensee is the company known as Energia y Industrias Aragonesas; two 7.5-ton units are being operated at Sabinanigo. In Switzerland licenses have been extended to the Ammonia Casale Co. and the Usines Electriques de la Lonza. Two 3.5-ton units are under construction. The S. A. des Fours a Coke Semet Solvay & Piette has three 7.5-ton units under construction in Brussels. In Italy the Casale patents are under license to the Societa Italiana Ammoniaci Sintetica. It operates two plants, one at Terni and one at Nera Montoro. The capacity of this latter plant is to be increased shortly to 30 tons of ammonia per day.

The Ammonia Company of New York holds a general license for the use of the Casale patents, but fertilizer rights are excluded. This company is operating two 7.5-ton units at Niagara Falls and a third unit is now being assembled. The fertilizer rights are in the hands of the Hydroelectric Chemical Co. of New York.

The development of the Casale process is of particular interest in the West, because of its relationship to hydroelectric development. Operations under Casale patents are contemplated by the Washington Irrigation and Development Co. at its large project at Priest Rapids on the Columbia River in the State of Washington.

Financial

E. I. du Pont de Nemours & Co. have declared regular quarterly dividends of 2 per cent on the common and 1½ per cent on debenture stocks. E. I. du Pont Powder Co. also has declared regular quarterly dividends of 1½ per cent on common and 1½ per cent on preferred.

Plans for the sale of common stock of Corn Products Refining Co. to employees are being drawn, and application is pending before New York Stock Exchange to list \$750,000 additional stock.

The International Oxygen Co. of Newark, N. J., has declared a dividend of 3 per cent on all outstanding stock of the company.

The Vulcan Detinning Co. for quarter ended Sept. 30 reports net incomes of \$50,726 after depreciation, taxes and other charges, equivalent to \$2.09 a share earned on combined \$2,419,400 preferred and preferred A stocks outstanding. This compares with \$47,713, or \$1.97, on both preferred stocks, in preceding quarter, and \$21,743, or 89c. a share, before depreciation in third quarter of 1923.

Latest Quotations on Industrial Stocks

	Month	This
	Ago	Week
Air Reduction	83½	84½
Allied Chem. & Dye	71½	76½
Allied Chem. & Dye pfd.	117	117½
Am. Ag. Chem.	12½	14½
Am. Ag. Chem. pfd.	35½	40½
American Cyanamid	*98	*95
Am. Drug Synd.	5½	5½
Am. Linseed Co.	18½	21½
Am. Linseed pfd.	40½	42
Am. Smelting & Refining Co.	75½	84½
Am. Smelting & Refining pfd.	104	105
Archer-Daniels Mid. Co. w.l.	20	24
Archer-Daniels Mid. Co. pfd.	88	89
Atlas Powder	48	49
Casale Co. of Am.	*67	*68
Certain-Teed Products	35	39
Commercial Solvents "A"	70	88
Corn Products	37	38½
Corn Products pfd.	120½	120
Davison Chem.	45½	41½
Dow Chem. Co.	*52	*54
Du Pont de Nemours	122½	133
Du Pont de Nemours db.	92½	92
Freeport-Texas Sulphur	9	7½
Gold Dust	37½	39½
Grasselli Chem.	*124	*124
Grasselli Chem. pfd.	*104	*103
Hercules Powder	*87	*88
Hercules Powder pfd.	*104	*103
Heyden Chem.	2½	3
Int'l Ag. Chem. Co. (new)	5½	6½
Int'l Ag. Chem. pfd. (ctfs.) ..	*41	9½
Int'l Nickel	19½	20
Int'l Nickel pfd.	90½	92
Int'l Salt	*76½	74
Mathieson Alkali	37	38
Merk & Co.	61	61
National Lead	156	160
National Lead pfd.	117	117½
New Jersey Zinc	162	181
Parke Davis & Co.	*80	*80
Pennsylvania Salt	*82½	*83
Procter & Gamble	*109	*110
Sherwin-Williams	31	31½
Sherwin-Williams pfd.	*103½	100½
Tenn. Copper & Chem.	7½	8
Texas Gulf Sulphur	78½	84½
Union Carbide	60½	65
United Drug	96½	107
United Dyewood	*40	27½
U. S. Industrial Alcohol	72½	84½
U. S. Industrial Alcohol pfd.	104½	106
Va.-Car. Chem. Co.	*13	2½
Va.-Car. Chem. pfd.	3½	6½

*Nominal. Other quotations based on last sale.

Men You Should Know About

SIR WILLIAM ALEXANDER, managing director of the British Dyestuffs Corporation, arrived in the United States, Nov. 14, on the "Aquitania."

Dr. E. F. ARMSTRONG, the eminent British industrial chemist who has been in the United States for several weeks, addressed the Chemical Society of Washington on Thursday, Nov. 13. Dr. Armstrong has been investigating industrial conditions in the soap industry in the United States; he returns to England about the end of November.

Dr. CARL BENEDICKS, director of the Metallographic Institute of Stockholm, Sweden, is to deliver the annual lecture before the Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers at its annual meeting the third week in February. Dr. Benedicks will also deliver other lectures during February and March.

G. E. EMMONS, vice-president in charge of manufacturing of the General Electric Co., who has been identified with the electrical industry since 1886, plans to retire and will move from Schenectady to Pasadena, Calif.

P. S. GILCHRIST, of the Chemical Construction Co., Charlotte, N. C., has been critically ill for the past 6 weeks, but is now on the road to recovery.

GEORGE A. HENDERSON, consulting engineer with the Ordnance Department, U. S. Army, has resigned to go into private practice in New York City, his office being located at 51 West 66th St. He will specialize in safety methods as applied to construction, industrial plants and pyroxylin, chemical and explosive manufacture.

Prof. HAROLD HIBBERT, of Yale University, addressed the Connecticut Valley section of the A.C.S. in the new Goessmann Chemical Laboratory of Amherst Agricultural College on Oct. 4, his subject being "Artificial Silk and Some Aspects of the Determination of Plant Constituents." On Oct. 31 he spoke to the Lowell Textile School, Junior Section of the American Society of Dyers and Colorists on "Artificial Silk," and discussed the same subject on Nov. 1 before the Providence section of the same society. The latter talk was illustrated by an actual demonstration of the manufacture of viscose silk, using a laboratory model. Prof. Hibbert has been invited to open the discussion on artificial silk at the annual meeting of the American Society of Dyers and Colorists in Philadelphia next month.

Prof. JAMES KENDALL, of the department of chemistry, Columbia University, who served as a lieutenant in the Bureau of Ordnance of the U. S. Navy during the war and functioned as liaison officer with the allied governments in the field of naval chemical warfare, has been re-enrolled as a specialist in the U. S. Navy Reserve Force, with promotion to the rank of Lieutenant-Commander.

Dr. S. C. LIND, the chief chemist of the Bureau of Mines, delivered an ad-

dress on "Helium and Its Uses" before the Brooklyn Institute of Arts and Sciences on Nov. 8.

R. H. MCMASTER, of Toronto, a director of Canadian Explosives, Ltd., has been appointed to the directorate of the Canadian Pacific Railway to fill the vacancy created by the death of Lord Shaughnessy.

REGINALD WEHRKAMP RICHTER, formerly with the U. S. Metals Refining Co. in Carteret, N. J., in the smelter department, is now with the American Smelting & Refining Co., Perth Amboy, N. J., as chemist.

B. H. SHERMAN has severed his connection as chief chemist with the Northern Paper Mills, Green Bay, Wis., to become chemical engineer with Charles W. Hills, patent attorney, at Chicago, Ill.

JOHN J. WATSON, JR., chairman of the Lee Tire & Rubber Corporation, Conshohocken, Pa., has been named president of its subsidiary, the Republic Rubber Corporation, Youngstown, Ohio, to succeed Edward H. Fitch, deceased.

Obituary

WILLIAM H. EMERSON, dean of the department of chemistry at the Georgia School of Technology, died at his home in Atlanta, Nov. 13, following an illness of more than a year. His death came as a distinct shock to his friends and members of the student body who had planned a home-coming celebra-

tion in his honor on Thanksgiving Day. An oil painting of the dean was to have been presented to him by the class of 1924 and a luncheon of students and alumni of the institution had been planned in his honor. Dr. Emerson was born June 17, 1860, at Tunnel Hill, Ga. He attended the grade and high schools of his community, and in 1876 received an appointment to the Naval Academy at Annapolis. Graduating from there with honors in 1880, he served as a naval officer 3 years, resigning in 1883 to resume his studies of chemistry at Johns Hopkins University. Securing a Ph.D. from that institution 2 years later, he taught at Citadel University until 1888, when he was called to head the chemistry department of the Georgia School of Technology, then opening its doors for the first time. Dr. Emerson advanced to dean of the department of chemistry in 1910, and in 1912 he was awarded the degree of Doctor of Science by the University of Georgia.

To Celebrate Carnot Centenary

The hundredth anniversary of the announcement by the French physicist and engineer, Nicholas Leonard Sadi Carnot, of the principle of thermodynamics, later known as the Second Law of Thermodynamics, and the Carnot Cycle, will be celebrated by American engineering, physical and chemical societies and educational institutions of the New York metropolitan district in the auditorium of the Engineering Societies Building, 29 West 39th St., New York City, on Thursday, Dec. 4, at 8:15 p.m.

Addresses will be made by Dr. Michael I. Pupin, professor of electro-mechanics, Columbia University, on "Carnot's Principle" and by Dr. William LeRoy Emmet, consulting engineer, General Electric Co., on "Application of Carnot's Principle to Engineering."

Calendar

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, Smithsonian Institution, Washington, D. C., Dec. 29 to Jan. 3.

AMERICAN ASSOCIATION TEXTILE CHEMISTS AND COLORISTS, Bellevue-Stratford, Philadelphia, Dec. 8.

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, Hotel Shenley, Pittsburgh, Pa., Dec. 3 to 6.

AMERICAN PETROLEUM INSTITUTE, annual meeting, Fort Worth, Tex., Dec. 9, 10 and 11.

AMERICAN PULP AND PAPER MILL SUPERINTENDENTS ASSOCIATION, Niagara Falls, N. Y., June 4 to 6, 1925.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS, New York, Dec. 1 to 4.

AMERICAN SOCIETY OF REFRIGERATING ENGINEERS, New York, Dec. 1 to 3.

AMERICAN SOCIETY FOR TESTING MATERIALS, twenty-eighth annual meeting, Atlantic City, N. J., June 22 to 26, 1925.

CANADIAN NATIONAL CLAY PRODUCTS ASSOCIATION, twenty-third annual convention, Prince George Hotel, Toronto, Canada, Jan. 20 to 22, 1925.

CANADIAN PULP AND PAPER ASSOCIATION, Montreal, Jan. 28 to 30, 1925.

NATIONAL EXPOSITION OF POWER AND MECHANICAL ENGINEERING, Grand Central Palace, New York, Dec. 1 to 4.

SOCIETY OF CHEMICAL INDUSTRY, presentation of Grasselli medal, New York, Dec. 5.

SOUTHERN EXPOSITION, Grand Central Palace, New York, Jan. 19 to 31, 1925.

Industrial Notes

The Kilborn & Bishop Co., of New Haven, Conn., announces a consolidation with the Bay State Forge Co., of Springfield, Mass. The consolidated business will be conducted at New Haven, Conn., under the name of the Kilborn & Bishop Co.

The Conveyors Corporation of America, Chicago, Ill., announces the appointment of Frederick E. Bausch, 1105 Chemical Building, St. Louis, Mo., as district representative of its organization in eastern Missouri and southern Illinois. Mr. Bausch will handle the sales of the American steam jet ash conveyor, American cast-iron storage tanks, American air-tight doors for ash pits and boiler settings and other specialties.

The Roller-Smith Co., 233 Broadway, New York, N. Y., announces the appointment of the Thrall Electric Co., Presidente Zayas No. 27 and Esquina A Habana, Havana, Cuba, as its exclusive representative for the Island of Cuba. The Thrall Electric Co. will carry a comprehensive stock of Roller-Smith instruments and circuit breakers.

Market Conditions

Improvement in Contract Orders for Heavy Chemicals

Buyers Place Contracts for 1925 Deliveries in Alkalies and Bleach Following Announcement of New Prices

MANY buyers apparently had been awaiting the result of election before placing orders for future requirements, as the announcement of new prices for alkalis, bleaching powder, and liquid chlorine has been followed by a good contracting movement. The fact that premiums are asked for spot shipments from works also has favored the placing of contracts as against a policy of buying for current needs. Interest in contracts has not been confined to the above named commodities and producers of bichromates, prussiates, cyanides, acids, etc., are reported to be carrying a good volume of orders for forward deliveries.

Despite some irregularity in values which has resulted in lower prices for a few selections, the general trend has been toward higher levels. The weighted index number advanced from 155.42 to 156 during the week. It was noted that the higher number was accounted for, in part, by firmer markets for imported chemicals. Reports also were heard to the effect that some foreign-made chemicals which have not yet been advanced in price, notably some of the potash products, were scheduled for advanced levels.

Consuming demand for chemicals and allied products in the spot market and for prompt shipment is increasing. This results from a gradual opening up in industrial lines. Reports from various industries which are users of chemicals are favorable and continued progress along those lines undoubtedly will be felt in a wider call for raw materials.

An announcement from Washington to the effect that the President had issued a proclamation under which duty on imports of diethyl-barbituric acid and salts was to be assessed on the American sales price was of interest in trade circles. This establishes a precedent since it is the first case where the method of levying duty has been changed from the foreign price to the domestic sales price.

Acids

Call for acetic acid is reported to be good for some strengths with others rather quiet. There has been no change in quotations or in fundamental conditions surrounding the market. Offerings of oxalic acid for shipment from abroad are firmer. This is regarded as an indication of lessened competition for the future but domestic producers have made no attempt to advance prices and spot material is still quoted at

9½c. per lb. Citric acid meets with an occasional buying flurry but the market is irregular and forward positions have not been active. Tartaric acid is quiet on spot with a few buyers inquiring regarding prices for delivery in the early part of next year. Lactic acid has worked into a firmer position and rumors are current that still higher prices will follow. Consumers are taking deliveries with regularity and unsold stocks are reported to be light. Sulphuric acid is moving freely on jobbing

Acetone Lower — Permanganate of Potash Advanced — Bichromates Easy — Imported Copper Sulphate Higher — Contract Business in Caustic Soda and Soda Ash — Yellow Prussiate of Potash Lower for Shipment — Denatured Alcohol Strong — Good Call for Calcium Chloride — Acetate of Lead Unsettled

account and large consumers are taking supplies against contracts. With surplus stocks reduced, producers were interested in reports that some of the raw materials used in the manufacture of this acid were to be marked up in price. Nitric acid is steady with a good movement from works and the same applies to muriatic.

Potashes

Bichromate of Potash—Inquiry is reported to be fairly seasonal with small lots in demand. Values show no tendency to harden and in some quarters the market is described as easy with a possibility that large-lot buyers could shade the quotation of 8½@8¾c. per lb.

Caustic Potash—While the present buying movement is not active, as many consumers are provided for, the tone is firm. Holders of spot material quote 7½@7¾c. per lb. and the difference is said to be based on quality as well as on seller. Cables report firm markets abroad and while 7½c. per lb. is still possible there are sellers who quote 7¾c. per lb. as an inside price. Domestic caustic is held at 7½@7¾c. per lb., at works.

Chlorate of Potash—The market is described as routine with large buyers

covered ahead and spot transactions limited to small lots. Asking prices remain at 7@7½c. per lb. for spot with the inside figure applying to shipments from abroad.

Permanganate of Potash—Inquiry for imported permanganate found the market in a strong position. Early in the week spot goods sold at 13½c. per lb. but this quotation soon gave way to higher prices. In the latter part of the period asking prices showed a range according to seller. In some quarters it was stated that offerings were available at 14c. per lb., but other sellers gave 15c. per lb. as their lowest figure. Shipments from abroad also were higher and toward the close 15c. per lb. was asked and some cables quoted as high as 16c. per lb. Domestic permanganate followed the lead of the imported and was quoted at 15c. per lb.

Prussiate of Potash—Foreign material is setting the price in domestic markets and reports received last week were more in favor of buyers. Yellow prussiate for shipment from European markets was offered at 16c. per lb. The lower price for shipments had a corresponding effect on spot values and sellers were willing to accept 16½c. per lb. for spot holdings.

Sodas

Acetate of Soda—Reports of sales at 4½c. per lb. have been heard but sellers report a good demand and say the carlot price is 5c. per lb. at works with higher prices being obtained for less than carlots.

Bichromate of Soda—The contract movement is reported to have been large enough to take up a good part of future production. It is stated, however, that contract orders have not been widely distributed but a greater part has been placed with a few producers. The spot market has improved but values are held at unchanged levels and prices are said to be irregular because of competition when large orders are at stake. Quotations are 6½@6¾c. per lb. according to seller, quantity, and delivery.

Caustic Soda—Jobbing orders have been more regular and the smaller buyers are taking a fair total at present. Contract orders have increased since the prices were made public and a large volume of caustic is said to have been sold for 1925 delivery. As recently announced the contract price is \$3.10 per 100 lb. flat for solid 76 per cent. Ground and flake are quoted on contract at \$3.50 per 100 lb. These prices are f.o.b. works and prompt shipment from works is quoted at a premium of 5c. per 100 lb. in the case of solid and 10c. per 100 lb. for ground and flake. Export inquiry is moderate

with f.a.s. quotations ranging from \$2.90 to \$3.05 per 100 lb.

Fluoride of Soda—Consumers are not proving to be heavy buyers at present but surplus stocks have undergone a reduction and holders are reserved with a tendency to advance prices. Spot fluoride is held at an inside price of 8½c. per lb. with smaller lots up to 9c. per lb.

Nitrate of Soda—A scarcity of refined nitrate of soda was expected as a result of the destruction of one of the largest plants but no attempt has been made to advance values and it is stated that this producer will be able to take care of his customers. The granulated is quoted at 4½@4¼c. per lb. and the powdered at 5½@5¼c. per lb. Crude nitrate is firm with spot at \$2.42½ per 100 lb. and later deliveries command a premium, varying according to time of delivery. Sales made in Chile since the beginning of the nitrate year are far in excess of the total for the corresponding period last year.

Miscellaneous Chemicals

Acetate of Lead—Prominent factors continue to quote at the higher level which went into effect last week. They point to the higher market for the metal as warranting the present selling schedule for acetate. In some cases it is stated that quiet demand has influenced sales under the quoted prices and it is also stated that imported offerings have been offered under the prices asked for domestic. Quotations for the latter are 14½c. per lb. for brown, broken, and 15½c. per lb. for white crystals.

Acetate of Lime—According to reports from manufacturers to the Department of Commerce, production of acetate of lime in September was 8,449,457 lb. Shipments were 10,022,960 lb. and stocks on hand at the end of September were 17,554,160 lb. These figures do not represent the entire industry and because a smaller number of producers have reported, the totals as given for September do not offer a fair basis for comparison with figures published for the earlier months of the year. Present demand is not heavy but prices are continued at \$3 per 100 lb.

Acetone—Competition has been keen and in some quarters prices have been openly quoted at lower figures. The inside price is 15c. per lb. and ranges up to 17c. per lb. according to make and seller.

Bleaching Powder—The announcement of new contract prices as made a week ago has stimulated interest in next year's requirements and a good volume of business is reported to have been placed. The contract price is \$1.90 per 100 lb. for carlots, in standard drums and \$2.05 per 100 lb. for less than carlots. Contract price for carlots in small drums is \$2.15 per 100 lb. with less than carlots at \$2.30 per 100 lb. Liquid chlorine also is receiving attention from buyers with contracts offered at 4c. per lb. in tanks and 5½c. to 8c. per lb. in cylinders, according to quantity.

Calcium Chloride—The past week has brought a revival of buying interest

"Chem. & Met." Weighted Index of Chemical Prices

Base = 100 for 1913-14

This week	156.00
Last week	155.42
Nov., 1923	166.00
Nov., 1922	159.00
Nov., 1921	147.00
Nov., 1920	240.00
Nov., 1919	239.00
Nov., 1918	279.00

The advance of 58 points in the weighted index number was brought about by higher prices for permanganate of potash, copper sulphate, crude cottonseed oil and linseed oil.

and orders are reported to have been placed for deliveries over distant periods. The prices quoted are \$21 per ton for 73@75 per cent, in drums, and \$27 per ton for flake, 73@75 per cent.

Copper Sulphate—Higher production costs have had a strengthening effect on foreign markets. This was shown by receipt of cables quoting higher

prices for shipment from abroad with 4½c. per lb. now asked. Domestic sulphate varies in price according to make and seller with prevailing quotations 4½c. to 4¾c. per lb.

Alcohol

Rumors of a higher market for denatured alcohol were heard, but no actual change in the selling basis was announced by first hands. Demand was good, the cold weather stimulating business in the grades used in anti-freezing mixtures. No. 1 special, 190 proof, held at 55@55½c. per gal., in drums, carload lots.

Trading in methanol was moderate at all times and prices were just about steady. The production in September amounted to 464,702 gal., against 444,612 gal. in August and 574,124 gal. in September a year ago. Prices were repeated on the carload basis of 76c. per gal. for the 97 per cent material, in drums.

Coal-Tar Products

Byproduct Coke Production Up 10.3 Per Cent in October—

Crudes Firm—Improved Call for Intermediates

PRODUCTION of byproduct coke in October, according to the Geological Survey, amounted to 2,899,000 tons, against 2,543,000 tons in September, an increase of 10.3 per cent. The gain in production reflected improvement in iron and steel market. The monthly average in production of byproduct coke for the 4 months ended Oct. 31 was 2,563,500 tons, which compares with 3,133,000 tons, the monthly average for 1923. Out of 75 plants now in existence in this country 68 were active in October. Of the total quantity produced 82.9 per cent was made in plants affiliated with iron furnaces. The market for crudes underwent little change in the past week, offerings being light and the undertone firm. The fact that producers were asking a premium on refined naphthalene for 1925 delivery caused holders of spot goods to raise their ideas. Phenol was quite firm in some quarters, stocks of unsold material being small. Demand for intermediates, taken as a whole, continues to show improvement and prices for many items in the list are working into a firmer position.

Aniline Oil—Leading makers reported sales on the basis of 16c. per lb., drums extra, carload lots, works. The demand was fair and the undertone firm. Aniline oil for red was nominally unchanged at 40c. per lb.

Benzene—While there has been some gain in the output of benzene demand has been sufficient to absorb additional offerings and the market remains firm, though quotably unchanged. First hands quote 23c. per gal. on the 90 per cent grade and 25c. per gal. on the pure, tank car basis, f.o.b. point of production.

Creosote—The domestic offerings were scanty and prices largely nominal. On imported material the undertone

has improved in favor of sellers. English makers quote from 5½@6d. per gal., loose, works. A shipment arrived here recently from Antwerp.

Cresylic Acid—So far as prices were concerned the market was without change. Producers have been sellers of 97 per cent material in carload lots at 59c. per gal., f.o.b. works. Spot material, in drums, held at 62@66c. per gal., as to quantity and make.

H-Acid—While some factors were credited with taking business at a shade below 70c., leading makers reported sales at this level. Buying interest was good and the undertone appeared firmer.

Naphthalene—Offerings were not so pressing on spot, due largely to the firmer ideas of makers in regard to 1925 contracts. As pointed out some time ago the prices asked on flake for 1925 delivery held around 5½c. per lb., with balls at 6½c. per lb. Flake on spot settled at 5@5½c., immediate delivery. Chipped naphthalene was nominal at 4½@4¾c. Crude, to import, was available at 2c. per lb.

Ortho-toluidine—Business was fair and the market firm at 14@15c. per lb., as to quantity.

Para-nitrotoluene—Offerings came on the market at 40c. per lb., but all sellers would not meet this figure.

Phenol—Some traders reported a firmer tone, yet this was not reflected in prices asked. There were sellers on the old basis of 24@25c. per lb., in drums, the inside figure obtaining on the large containers. Phenol for future delivery was nominally unchanged at 24c. per lb., in drums.

Pyridine—Scattered lots sold down to \$3.90 per gal., with most sellers firm at \$4@4.10 per gal. Offerings have increased of late.

Vegetable Oils and Fats

Active Trading in Crude Cottonseed Oil—Linseed Advances— Coconut Oil Higher on Light Stocks—Tallow Up

WHILE trading in vegetable oils and fats appeared less active than a week ago, the movement into consuming channels was reported as satisfactory and prices paid revealed a rather firm market for spot and nearby material. The average price paid for crude cottonseed oil at mills was as high as that for the preceding week, notwithstanding the slight reaction in refined oil. Linseed oil sold at higher levels. Soap makers were buyers of coconut oil and tallow at an advance in price. Offerings of palm oils were scanty and prices largely nominal. Soya bean oil was strong on improved buying interest.

Cottonseed Oil—The disappearance of refined oil reached the total of 328,000 bbl. in October, a record quantity for recent years. Estimates on November business were almost as high. This news was accepted as bullish, yet the market did not respond, due largely to the absence of outside speculative interest. On the other hand refiners did not let up in applying pressure to the options, selling January forward against purchases of crude. Advances from the South indicated that liberal quantities of crude were absorbed during the week at prices ranging from 8½@9c. per lb., tank cars, f.o.b. mills. In the option market for refined prime summer yellow oil November closed on Thursday at 10.90@11c. per lb., with January at 10.64@10.65c. per lb., and May at 10.84@10.85c. per lb. November tenders were increased to 5,000 bbl. Demand for cash oil was good. Export inquiry was in evidence all week, but most buying limits were a shade under the market. Lard compound was firm at 13@13½c. per lb., carload lots. Unsettled in pure lard and other hog products had a depressing effect on refined oil. The hog run has exceeded expectations and this resulted in pressure. Pure lard in Chicago, cash, closed at 14.50c. per lb., which compares with 14.85c. per lb. a week ago. Stocks of lard in the Chicago district on Nov. 15 amounted to 8,170,000 lb., against 11,734,000 lb. on Nov. 1, and 5,508,000 lb. a year ago.

Linseed Oil—Duluth flaxseed was from 2@3c. per bu. lower than a week ago, yet prices for oil were higher. The strength in oil values was due, in part, to the shortage in spot and nearby material. Demand subsided at the higher prices and this caused some uneasiness among sellers, especially as regards futures. Prompt shipment oil settled at \$1.10@1.11 per gal., with December at \$1.08@1.09 and January forward at \$1.07, cooperage basis, carload lots. Early in the week the Argentine official estimate on the new crop was issued, the forecast placing the yield at 53,200,000 bu., which would make the exportable surplus 46,000,000 bu. This estimate will be revised from time to time. The figures were regarded as too high by most traders, but did result in raising some of the private estimates. Crushers look for a maxi-

mum of 40,000,000 bu. exportable surplus. Weather conditions were unfavorable. In the Duluth market trading in seed was fairly active. Receipts of domestic seed at Northwestern terminals have been large, the arrivals from Sept. 1 to date amounting to more than 19,500,000 bu. Duluth quotes November seed at \$2.64 per bu., with May at \$2.71½ per bu. Buenos Aires quotes \$2.28½ per bu. on December and 2.29½ per bu. on February. Cake for export was firm at \$48 per ton, f.a.s. New York.

China Wood Oil—Demand was less active and prices were a shade lower.

Substantial Gain in October Sales of Cottonseed Oil

Consumption of refined cottonseed oil in October set a new high record for the past 2 years, amounting to 328,000 bbl. This compares with 157,000 bbl. in September of this year and 231,000 bbl. in October, 1923. The visible supply on Oct. 31, according to an analysis of the Bureau of Census statistics, was 956,000 bbl., against 887,000 bbl. a year ago. Cottonseed and cottonseed products statistics for the first 3 months of the crop year, with a comparison, follow:

	Aug. 1 to Oct. 31— 1924	1923
Seed received, ton.....	1,824,057	1,692,833
Seed crushed, ton.....	1,084,553	965,505
Crude oil mfd., lb.....	32,019,130	281,596,612
Refd. oil mfd., lb.....	224,296,671	174,955,634
Stocks, Oct. 31:		
Seed, ton.....	855,128	739,947
Crude oil, lb.....	82,808,298	94,992,633
Refined oil, lb.....	73,414,731	71,391,979
Exports, 3 months:		
Crude oil, lb.....	1,270,505	2,839,629
Refined oil, lb.....	3,172,706	3,595,596
Cake and meal, ton.....	76,374	34,130

Tank cars were offered at 13½c. per lb., f.o.b. Pacific coast. Spot oil in New York settled at 16c. asked, cooperage basis.

Corn Oil—November delivery crude oil sold at 10c. per lb., tank cars, Chicago, with December nominal at 9½c. per lb.

Coconut Oil—Offerings on spot were scanty and prices were slightly higher. On the coast prompt shipment oil sold at 9½c., with 10c. asked later. January forward from the coast was nominal at 9½@9¾c., tank car basis. In New York December shipment Ceylon type oil sold at 10½c. per lb. There was talk of a "squeeze" in December.

Palm Oils—One lot of Niger oil now afloat sold at 8½c. per lb. Lagos palm oil for Dec.-Jan. shipment from Africa was offered at 9.60c. per lb., c.i.f. New York. Trading restricted for want of nearby offerings.

Other Vegetable Oils—Last sales of crude soya bean oil went through at 11½c. per lb., tank cars, duty paid, f.o.b. Pacific coast; good inquiry for nearby material. Palm kernel oil offered at

10½c. per lb., in casks, shipment from England. Refined rapeseed oil, English, forward delivery, \$1.01 per gal.; Japanese, 98c. per gal.

Fish Oils—Oriental crude sardine oil sold at 50c. per gal., tank cars, f.o.b. Pacific coast. Newfoundland cod oil, crude, offered at 60c. per gal. N. Y. Crude menhaden oil 55c. per gal., tank cars, North Carolina, and 58c. per gal., tank cars, Baltimore.

Tallow, etc.—More than 700,000 lb. of extra special tallow sold to soapers at 10c. per lb., and advance of ½c. Market firm at 10c. bid. Yellow grease firm at 9@9½c. per lb. Red oil advanced to 11@11½c. per lb. Oleo stearine lower, sales at 11½c. per lb.

Miscellaneous Materials

Antimony—Market was firm at recent advance. Japanese and Chinese antimony held at 15c. per lb. on spot. Cookson's "C" grade 16½@17c. per lb. Chinese needle, lump, nominal at 10c. per lb. Standard powdered needle, 200 mesh, 11½c. per lb. White antimony oxide, Chinese, 99 per cent, 13@14c. per lb.

Barytes—Fair trade reported and market steady. White floated \$23 per ton, carload lots, f.o.b. St. Louis. Crude, \$8.50@9 per ton, f.o.b. mines.

Glycerine—Dynamite sold at 17½c. per lb., in drums, carload lots, f.o.b. point of production, Middle West, a decline of ½c. Chemically pure was nominal at 18½@19c. per lb., in drums, the price varying according to seller and quantity. Crude soap-lye glycerine offered at 11½@11¾c., loose, f.o.b. point of production.

Lithopone—Producers report good contract business for early 1925 delivery. The market was nominally unchanged at 6@6½c. per lb., immediate shipment, while some sellers stood ready to shade this figure on contracts.

Manganese—Caucasian and Brazilian ore offered at 39@41c. per long ton, c.i.f. Atlantic ports. Better inquiry reported.

White Lead—Jobbing demand has eased off as is usual at this time of year. A good movement continues, however, against contracts and corrodors are reported to be finding good interest for deliveries in the first quarter of next year. Producing costs remain high and the metal was steady throughout the week. Prices for basic carbonate of lead are 10½c. per lb. for the dry product in kegs or casks, and 10c. per lb. for dry basic sulphate.

Zinc Oxide—Contract deliveries are heavy both to the paint and rubber trades. The outlook for next year also is regarded as favorable. The metal market is firm but competition is keen in some grades of the oxide and prices are repeated with American process, lead free, at 7½c. per lb., in bags, carload lots.

Solvent Naphtha—Stocks are not burdensome and prices were maintained in most quarters. On the water white 24@25c. represented the range on carload lots.

Imports at the Port of New York

November 14 to November 20

ACIDS—Citric—100 bbl., Messina, Order. Cresylic—99 dr., Antwerp, Lunham & Moore. Stearic—20 cs., Rotterdam, M. W. Parsons & Plymouth Organic Lab.

AMMONIUM CARBONATE—24 cs., London, Lo Curto & Funk.

AMMONIUM NITRATE—210 cs., Hamburg, Order.

ANTIMONY ORE—791 bg., Antofagasta, W. R. Grace & Co.

ANTIMONY REGULUS—250 cs., Shanghai, International Banking Corp.

ARSENIC—113 bg. arsenic ore, Sydney, Order; 624 bbl., Tampico, American Smelting & Refining Co.

ASBESTOS—1,091 bg., Capetown, Order.

BIARIUM NITRATE—10 cs., Hamburg, Order; 18 cs., Rotterdam, Order.

BARYTES—30 cs., Hamburg, A. Hurst & Co.; 51 bbl., Hamburg, Brown Bros. & Co.

BLANC FIXE—34 cs., Hamburg, Superfos Co.

CAMPHOR—112 cs., Hamburg, Order.

CHALK—500 tons, London, Taintor Trading Co.; 800,000 kilos crude, Dunkirk, J. W. Higman; 512 tons, Hull, Taintor Trading Co.; 500 bg., Antwerp, Reichard-Coulston, Inc.; 250 bg., Antwerp, L. H. Butcher Co.; 200 bg., Antwerp, National City Bank; 500 bg., Antwerp, Reichard-Coulston, Inc.

CHEMICALS—25 cs., Hamburg, J. C. Robold & Co.; 1 cs., Hamburg, Elmer & Amend; 23 pkg., Hamburg, Franklin Import & Export Co.; 10 cs., Dunkirk, Order; 10 bbl., Bremen, Stanley Doggett & Co.; 41 cs., Bremen, Mechanics & Metals National Bank; 300 bg., Bremen, Order; 100 cs., Rotterdam, Hans Hinrichs Chem. Co.; 54 pkg. coal-tar, Rotterdam, H. A. Metz & Co.

CLAY—210 bg. burnt, Hull, H. A. Robinson & Co.

COAL-TAR DISTILLATE—48 dr., Liverpool, Monsanto Chemical Works.

COLORS—144 pkg. aniline, Havre, Ciba Co.; 25 cs. do., Havre, Gelgy Co.; 15 cs. do., Havre, Carbic Color & Chemical Co.; 31 pkg. do., Havre, Sandoz Chem. Works; 5 cs. aniline, Hamburg, American Aniline Products Co.; 10 cs. do., Hamburg, Kuttroff, Pickhardt & Co.; 29 cs. ultramarine blue, Hull, Order; 11 cs. aniline, Genoa, Irving Bank-Col. Trust Co.; 5 cs. dry, Southampton, Sherwin-Williams Co.; 21 pkg., Havre, Sandoz Chemical Works; 8 cs. aniline, Hamburg, Order; 10 cs. do., Hamburg, American Aniline Products Co.; 6 pkg. do., Hamburg, Kuttroff, Pickhardt & Co.; 10 cs. ultramarine blue, Antwerp, J. Campbell & Co.; 2 bbl. dry, Antwerp, Irving Bank-Col. Trust Co.; 3 cs. aniline, Antwerp, Fidelity Intl. Trust Co.; 41 cs. earth, Bremen, Fezandie & Sperrle; 36 cs. do., Bremen, Heller & Merz; 10 cs. do., Bremen, Meteor Products Co.; 11 cs. bronze, Bremen, B. Drakenfeld & Co.; 13 pkg. bronze, Bremen, Order; 1 cs. aniline, Rotterdam, Grasseill Dye-stuff Corp.; 38 pkg. do., Rotterdam, Kuttroff, Pickhardt & Co.; 27 pkg. do., Rotterdam, H. A. Metz & Co.

CORUNDUM—718 bg., Delagoa Bay, Standard Bank of South Africa.

DEXTRINE—100 bg., Rotterdam, De Twentsche Bank; 50 bg., Rotterdam, National City Bank.

DIVI-DIVI—694 bg., Maracaibo, American Trading Co.

EPSOM SALT—750 bg., Hamburg, C. Tennant Sons & Co.; 500 bbl., Hamburg, Order.

FERROMANGANESE—280 cs., Havre, Order.

FUSEL OIL—29 dr., Rotterdam, Order.

GLYCERINE—40 cs. crude, Bordeaux, Order; 80 bbl., Marseilles, Marx & Rawolle.

GRAPHITE—338 bg. artificial, Genoa, E. S. Kuh & Valk Co.

GUMS—126 bg. damar, Singapore, Guaranty Trust Co.; 131 bg. damar, Singapore, Chemical National Bank; 140 bg. do., Singapore, American Exchange National

Bank; 240 bg. copal and 749 pkg. damar, Singapore, Baring Bros. & Co.; 280 bg. copal, Singapore, L. C. Gillespie & Sons; 362 pkg. kauri, Auckland, Order; 276 bg. copal, Antwerp, Equitable Trust Co.; 400 bg. arabic, Port Sudan, Order; 579 bg. arabic, Port Sudan, Brown Bros. & Co.; 160 bg. copal, Antwerp, Chemical National Bank; 310 bg. do., Antwerp, Irving Bank-Col. Trust Co.; 70 pkg. damar, Singapore, L. C. Gillespie & Sons; 203 pkg. damar and 106 cs. copal, Singapore, Baring Bros. & Co.; 242 pkg. copal and 100 cs. damar, Singapore, Order; 300 cs. damar, Batavia, Order; 185 bskt. copal, Macassar, Standard Bank of South Africa; 507 bskt. copal, Macassar, Catz American Co.; 255 bskt. copal, Macassar, Equitable Trust Co.; 58 bskt. copal, Macassar, A. Klipstein & Co.; 443 pkg. do., Macassar, France, Campbell & Darling; 579 bskt. do., Macassar, Kidder, Peabody & Co.; 1,437 bskt. do., Macassar, Order; 345 pkg. damar and 135 pkg. copal, Batavia, Order.

ICHTHYOL—32 cs., Hamburg, Merck & Co.

IRON OXIDE—228 bbl., Malaga, W. Schall & Co.; 374 bbl., Malaga, C. J. Osborn Co.; 177 bbl., Malaga, Reichard-Coulston, Inc.; 75 bbl., Malaga, E. M. & F. Waldo; 283 bbl., Malaga, C. K. Williams & Co.; 150 bbl., Malaga, Order; 10 cs., Liverpool, J. H. Rhodes & Co.

IRON POWDER—20 cs., Rotterdam, Roessler & Hasslacher Chem. Co.

LITHOPONE—40 cs., Antwerp, A. Klipstein & Co.

MAGNESITE—5,400 bg., Madras, Order; 125 bg. and 43 bbl., Rotterdam, A. Kramer & Co.; 375 bg. and 123 bbl., Rotterdam, Speiden, Whitfield & Co.

MANGANESE ORE—6,021 tons, Seccondee, E. J. Lavino & Co.

NICKEL ORE—224,000 lb., Sydney, United States Nickel Co.

OSHER—355 bbl. and 19 cs., Marseilles, American Exchange National Bank; 1,010 bbl., Marseilles, Reichard-Coulston, Inc.; 185 bbl., Marseilles, Order; 200 bbl., Marseilles, F. B. Vandegriff & Co.; 25 bbl., Alicante, Order.

OILS—China Wood—621 tons (at San Francisco), Hong Kong, Order; 425 bbl., Shanghai, Mitsui & Co. Palm—28 cs., Liverpool, Order; 297 cs., Hamburg, African & Eastern Trading Co.; 100 cs., Liverpool, African & Eastern Trading Co.; 72 cs., Liverpool, Guaranty Trust Co.; 144

csk. and 209 bbl., Liverpool, Order; 238 csk., Liverpool, Order; 61 csk. and 50 bbl., Rotterdam, Guaranty Trust Co.; 81 csk., Rotterdam, Order. Rapeseed—20 cs., Havre, American Express Co.; 320 bbl., Hull, Order.

PITCH—144 bbl. cottonseed oil, Marseilles, Order.

PLUMBAGO—100 bbl. and 1,208 bg., Colombo, Order; 266 bg. and 150 bbl., Colombo, New York Trust Co.

POTASSIUM SALTS—32 cs. alum, Hamburg, J. Munroe & Co.; 250 cs. chlorate, Hamburg, Monmouth Chemical Corp.; 10 cs. chlorate, Havre, C. Hardy, Inc.; 1,270 bg. nitrate, Hamburg, Order; 150 bbl. sulphate, Bremen, Potash Importing Corp. of America.

PLATINUM POWDER—1 cs., Balboa, Mercke & Co.; 3 cs., Balboa, Order.

PUMICE—110 bg., Canneto Lipari, C. B. Richard & Co.; 3,010 bg., Canneto Lipari, Griffiths & Co.; 8,008 bg., Canneto Lipari, Manufacturers Trust Co.

SHELLAC—150 bg., Calcutta, Mechanics & Metals National Bank; 100 bg., Calcutta, American Exchange National Bank; 200 bg., Calcutta, H. W. Peabody & Co.; 133 pkg., Calcutta, Marx & Rawolle; 1,801 bg., Calcutta, Order; 100 bg., Calcutta, Mechanics & Metals National Bank; 350 bg., Calcutta, Mac Lac Co.; 265 bg., Calcutta, Marx & Rawolle; 250 bg., Calcutta, Standard Bank of South Africa; 100 bg., Calcutta, H. W. Peabody & Co.; 2,546 bg., Calcutta, Order.

SILVER SULPHIDE—6 cs., South America, Goldsmith & Co.

SODIUM SALTS—44 cs. prussiate, Liverpool, Order; 136 bbl. silico fluoride, Copenhagen, Order; 168 cs. cyanide, Havre, International Banking Corp.; 500 cs. chlorate, Hamburg, Monmouth Chemical Corp.; 20,925 bg. nitrate, Iquique, Wessel, Duval & Co.; 13,507 bg. do., Iquique, E. I. du Pont de Nemours & Co.; 6,914 bg. do., Iquique, Antony Gibbs & Co.; 43 cs. bisulphate, Antwerp, Order; 19 cs. prussiate, Liverpool, Order; 128 cs. bromide, Hamburg, Superfos Co.; 187 cs. bromide, Hamburg, E. I. du Pont de Nemours & Co.; 53 cs. prussiate, Rotterdam, Meteor Products Co.; 4 cs. chlorate, Rotterdam, Order; 7,872 bg. nitrate, Iquique, W. R. Grace & Co.

STARCH—500 bg. potato, Rotterdam, Stein, Hall & Co.; 150 bg., Rotterdam, Brown Bros. & Co.

SUMAC—700 bg. ground, Palermo, J. S. Young & Co.; 700 bg. do., Palermo, Order; 350 bg. do., Palermo, Irving Bank-Col. Trust Co.; 100 bbl. leaf and 280 bg. ground, Palermo, Order.

TALC—500 bg., Genoa, L. A. Salomon & Bros.; 250 bg., Genoa, Order.

TALLOW—150 tcs., Vancouver, Procter & Gamble.

TARTAR—487 bg., Bordeaux, American Express Co.; 984 bg., Marseilles, Royal Baking Powder Co.; 470 bg., Marseilles, C. Pfizer & Co.; 229 bg. Valencia, Royal Baking Powder Co.

VALONEA—1,600 bg., Piraeus, A. Benedava.

VANADIUM—6,000 bg., Callao, Vanadium Corp. of Am.

VERMILION—12 kegs, London, Tice & Lynch.

WATTLE BARK—3,425 bg., Capetown, Order.

WAXES—39 bg. beeswax, Alexandria, Order; 17 bg. do., Santo Domingo, J. J. Julia & Co.; 50 cs. beeswax, Hamburg, Bergstrom & Co.; 10 bbl. beeswax, Lisbon, Order; 1,600 bg. white paraffine, Balikpapan, Asiatic Petroleum Co.

WHITING—3,700 bg., Havre, S. L. Libby & Co.

WOOL GREASE—150 bbl., Hamburg, American Trust Co.; 250 bbl., Hamburg, Order; 30 bbl., Bremen, Hummel & Robinson.

ZINC OXIDE—50 bbl., Marseilles, National City Bank; 60 bbl., Marseilles, Reichard-Coulston, Inc.; 150 bbl., Marseilles, Order.

ZINC CHLORIDE—36 dr., Rotterdam, Innis, Spelden & Co.

Opportunities in the Foreign Trade

Parties interested in any of the following opportunities may obtain all available information from the Bureau of Foreign and Domestic Commerce at Washington or from any district office of the bureau. The number placed after the opportunity must be given for the purpose of identification.

CALCIUM CYANAMIDE Antwerp, Belgium. Agency.—12,111.

CARBON BLACK Heidelberg, Germany. Agency.—12,109.

CARBON BLACK Shanghai, China. Purchase.—12,112.

CAUSTIC SODA, and soda ash. Christiania, Norway. Purchase.—12,123.

HYDROSULPHITE OF SODA in 5 to 10 ton lots. Vancouver, Canada. Purchase.—12,110.

NAPHTHALENE and linseed oil. Alexandria, Egypt. Agency.—12,096.

PAINTS Bushire, Persia. Purchase.—12,256.

PAINTS, dyes and heavy chemicals. Bloemfontein, South Africa. Agency.—12,290.

ROSIN. Danzig. Purchase and agency.—12,250.

PAINTS AND VARNISHES. Asuncion, Paraguay. Agency.—12,306.

FATS AND GREASES for soap making. Marseille, France. Agency.—12,237.

Current Prices in the New York Market

For Chemicals, Oils and Allied Products

Industrial Chemicals

Acetone, drums, works.	lb.	\$0.15 - \$0.16
Acetic anhydride, 85% dr.	lb.	.34 - .36
Acid, acetic, 28% bbl.	100 lb.	3.12 - 3.37
Acetic, 56% bbl.	100 lb.	5.85 - 6.10
Acetic, 80% bbl.	100 lb.	8.19 - 8.44
Glacial, 99% bbl.	100 lb.	11.01 - 11.51
Boric, bbl.	lb.	.09 - .09
Citric, kegs.	lb.	.45 - .46
Formic, 85% bbl.	lb.	.11 - .11
Gallie, tech.	lb.	.45 - .47
Hydrofluoric, 52% carboys	lb.	.11 - .12
Lactic, 44% tech., light, bbl.	lb.	.12 - .13
22% tech., light, bbl.	lb.	.06 - .06
Muriatic, 18% tanks.	100 lb.	.80 - .85
Muriatic, 20% tanks.	100 lb.	.95 - 1.00
Nitric, 36% carboys.	lb.	.04 - .04
Nitric, 42% carboys.	lb.	.04 - .05
Oleum, 20% tanks.	ton	16.00 - 17.00
Oxalic, crystals, bbl.	lb.	.09 - .09
Phosphoric, 50% carboys.	lb.	.07 - .08
Pyrogallie, resublimed.	lb.	1.55 - 1.60
Sulphuric, 60% tanks.	ton	8.00 - 9.00
Sulphuric, 60% drums.	ton	12.00 - 13.00
Sulphuric, 66% tanks.	ton	13.00 - 14.00
Sulphuric, 66% drums.	ton	17.00 - 18.00
Tannic, U.S.P., bbl.	lb.	.65 - .70
Tannic, tech., bbl.	lb.	.45 - .50
Tartaric, imp., powd., bbl.	lb.	.26 - .27
Tartaric, domestic, bbl.	lb.	.29 - .30
Tungstic, per lb.	lb.	1.20 - 1.25
Alcohol, butyl, drums, wks.	lb.	.28 - .30
Ethyl, 190 p.f. U.S.P., bbl.	gal.	4.89 - .
Denatured, 190 proof No. 1, special bbl.	gal.	.61 - .
No. 1, 190 proof, special, dr.	gal.	.55 - .
No. 1, 188 proof, bbl.	gal.	.65 - .
No. 1, 188 proof, dr.	gal.	.58 - .
No. 3, 188 proof, bbl.	gal.	.60 - .
No. 3, 188 proof, dr.	gal.	.55 - .
Alum, ammonia, lump, bbl.	lb.	.03 - .04
Potash, lump, bbl.	lb.	.02 - .03
Chrome, lump, potash, bbl.	lb.	.05 - .06
Aluminum sulphate, com. bags.	100 lb.	1.35 - 1.40
Iron free, bags.	lb.	2.35 - 2.45
Aqua ammonia, 26% drums.	lb.	.06 - .06
Ammonia, anhydrous, cyl.	lb.	.28 - .30
Ammonium carbonate, powd. tech., cases.	lb.	.12 - .12
Nitrate, tech., cases.	lb.	.09 - .10
Amly acetate tech., drums.	gal.	3.50 - 3.75
Antimony oxide, white, bbl.	lb.	.13 - .13
Arsenic, white, powd., bbl.	lb.	.06 - .06
Red, powd., kegs.	lb.	.14 - .15
Barium carbonate, bbl.	ton	54.00 - 55.00
Chloride, bbl.	ton	66.00 - 72.00
Dioxide, 88% drums.	lb.	.17 - .18
Nitrate, cases.	lb.	.10 - .10
Blanc fixe, dry, bbl.	lb.	.03 - .03
Bleaching powder, f.o.b. wks., drums, contract.	100 lb.	1.90 - .
Spot, wks., drums.	100 lb.	2.00 - 2.15
Borax, bbl.	lb.	.05 - .05
Bromine, cases.	lb.	.44 - .46
Calcium acetate, bags.	100 lb.	3.00 - 3.05
Arsenate, dr.	lb.	.08 - .08
Carbide, drums.	lb.	.05 - .05
Chloride, fused, dr. wks.	ton	21.00 - .
Gran. drums works.	ton	27.00 - .
Phosphate, mono, bbl.	lb.	.06 - .07
Carbon bisulphide, drums.	lb.	.06 - .06
Tetrachloride, drums.	lb.	.06 - .07
Chalk, precip., domestic, light, bbl.	lb.	.04 - .04
Imported, light, bbl.	lb.	.04 - .05
Chlorine, liquid, tanks, wks.	lb.	.04 - .
Contract, tanks, wks.	lb.	.04 - .
Cylinders, 100 lb. wks.	lb.	.05 - .07
Cobalt, oxide, bbl.	ton	2.10 - 2.25
Copperas, bulk, f.o.b. wks.	ton	15.00 - 16.00
Copper carbonate, bbl.	lb.	.17 - .17
Cyanide, drums.	lb.	.49 - .50
Oxide, kegs.	lb.	.16 - .16
Sulphate, dom. bbl.	100 lb.	4.65 - 4.75
Imp. bbl.	100 lb.	4.60 - 4.62
Cream of tartar, bbl.	lb.	.20 - .21
Epsom salt, dom. bbl.	100 lb.	1.75 - 2.00
Imp. tech., bags.	100 lb.	1.35 - 1.40
U.S.P., dom. bbl.	100 lb.	2.10 - 2.35
Ether, U.S.P., dr. concent'd.	lb.	.13 - .14
Ethyl acetate, 85% drums.	gal.	.92 - .95
Acetate, 99% dr.	gal.	1.08 - 1.10
Formaldehyde, 40% bbl.	lb.	.09 - .09
Fullers earth—f.o.b. mines.	ton	7.50 - 18.00
Furfural, works, bbl.	lb.	.25 - .
Fusel oil, ref., drums.	gal.	4.00 - 4.50
Crude, drums.	gal.	2.85 - 2.95
Glaucous salt, wks., bags.	100 lb.	1.20 - 1.40
Imp. bags.	100 lb.	.85 - .95
Glycerine, c. p., drums extra.	lb.	.18 - .18
Crude 80% loose.	lb.	.11 - .12
Hexamethylene, drums.	lb.	.66 - .70

THESE prices are first-hand quotations in the New York market for industrial chemicals, coal-tar products and related materials used in the industries that produce

Dyes
Paint and Varnish
Ceramic Materials
Fertilizers
Rubber
Sugar

Paper and Pulp
Petroleum
Soap
Explosives
Food Products
Metal Products

Whenever available these prices are those of the American manufacturer. If for material f.o.b. works or on a contract basis, quotations are so designated. All prices refer to large quantities in original packages.

Lead:		
White basic carbonate, dry, cases.	lb.	\$0.10 - .
White, basic sulphate, cases.	lb.	.10 - .
White, in oil, kegs.	lb.	1.240 - .
Red, dry, cases.	lb.	.11 - .
Red, in oil, kegs.	lb.	1.362 - .
Acetate, white crys., bbl.	lb.	.15 - .
Brown, broken, cases.	lb.	.14 - .
Arsenate, white crys., bbl.	lb.	.16 - \$0.18
Lime-Hydrated, b.g., wks.	ton	10.50 - 12.50
Bbl., wks.	ton	18.00 - 19.00
Lump, bbl.	280 lb.	3.63 - 3.65
Litharge, comm., cases.	lb.	.11 - .
Lithopone, bags.	lb.	.06 - .06
Magnesium carb., tech., bags.	lb.	.07 - .08
Methanol, 95% bbl.	gal.	.74 - .76
97% bbl.	gal.	.76 - .79
Pure, tanks.	gal.	.76 - .
drums.	gal.	.78 - .80
bbl.	gal.	.83 - .85
Methyl-acetone, t'ks.	gal.	.70 - .
Nickel salt, double, bbl.	lb.	.10 - .
Single, bbl.	lb.	.10 - .
Orange mineral, csk.	lb.	.14 - .14
Phosgene.	lb.	.60 - .75
Phosphorus, red, cases.	lb.	.70 - .75
Yellow, cases.	lb.	.37 - .40
Potassium bichromate, cases.	lb.	.08 - .08
Bromide, gran., bbl.	lb.	.43 - .48
Carbonate, 80-85% calcined, cases.	lb.	.05 - .05
Chlorate, powd.	lb.	.06 - .08
Cyanide, drums.	lb.	.47 - .52
First sort, csk.	lb.	.08 - .08
Hydroxide (caustic potash) drums.	lb.	.07 - .
Iodide, cases.	lb.	3.65 - 3.75
Nitrate, bbl.	lb.	.06 - .07
Permanganate, drums.	lb.	.14 - .15
Prussiate, red, cases.	lb.	.38 - .39
Prussiate, yellow, cases.	lb.	.16 - .16
Salammoniac, white, gran., cases, imported.	lb.	.06 - .06
White, gran., bbl., domestic.	lb.	.07 - .08
Gray, gran., cases.	lb.	.08 - .09
Salsoda, bbl.	100 lb.	1.20 - 1.40
Salt cake (bulk) works.	ton	16.00 - 18.00
Soda ash, light 58% flat, bulk, contract.	100 lb.	1.25 - .
bags, contract.	100 lb.	1.38 - .
Dense, bulk, contract, basis 58%.	100 lb.	1.35 - .
bags, contract.	100 lb.	1.45 - .
Soda, caustic, 76% solid, drums contract.	100 lb.	3.10 - .
Caustic, ground and flake, contracts, dr.	100 lb.	3.50 - 3.85
Caustic, solid, 76% f.a.s. N. Y.	100 lb.	2.90 - 3.05
Sodium acetate, works, bbl.	lb.	.05 - .05
Bicarbonate, bulk.	100 lb.	1.75 - .
Bichromate, cases.	lb.	.06 - .06
Bisulphate (niter cake).	ton	6.00 - 7.00
Bisulphite, powd., U.S.P., bbl.	lb.	.04 - .04
Chlorate, kegs.	lb.	.06 - .06
Chloride.	long ton	12.00 - 13.00
Cyanide, cases.	lb.	.19 - .22
Flouride, bbl.	lb.	.08 - .09
Hypsulphite, bbl.	lb.	.02 - .02
Nitrite, cases.	lb.	.09 - .09
Peroxide, powd., cases.	lb.	.23 - .27
Phosphate, dibasic, bbl.	lb.	.03 - .03
Prussiate, yel. bbl.	lb.	.09 - .09

Salicylate, drums.	lb.	\$0.38 - \$0.40
Silicate (40% drums).	100 lb.	.75 - 1.16
Silicate (60% drums).	100 lb.	1.75 - 2.00
Sulphide, fused, 60-62% drums.	lb.	.02 - .03
Sulphite, crys., bbl.	lb.	.03 - .03
Strontium nitrate, powd., bbl.	lb.	.09 - .09
Sulphur chloride, yel drums.	lb.	.04 - .05
Crude.	ton	18.00 - 20.00
At mine, bulk.	ton	16.00 - 18.00
Flour, bag.	100 lb.	2.25 - 2.35
Dioxide, liquid, cyl.	lb.	.08 - .08
Tin bichloride, bbl.	lb.	.15 - .15
Oxide, bbl.	lb.	.56 - .
Crystals, bbl.	lb.	.37 - .37
Zinc carbonate, bags.	lb.	.12 - .14
Chloride, gran., bags.	lb.	.06 - .07
Cyanide, drums.	lb.	.40 - .41
Dust bbl.	lb.	.08 - .08
Oxide, lead free, bags.	lb.	.07 - .
5% lead sulphate bags.	lb.	.06 - .
French, red seal, bags.	lb.	.09 - .
French, green seal, bags.	lb.	.10 - .
French, white seal, bbl.	lb.	.11 - .
Sulphate, bbl.	100 lb.	3.25 - 3.50

Coal-Tar Products

Alpha-naphthol, crude, bbl.	lb.	\$0.60 - \$0.62
Alpha-naphthol, ref., bbl.	lb.	.75 - .80
Alpha-naphthylamine, bbl.	lb.	.35 - .36
Aniline oil, drums.	lb.	.16 - .16
Aniline salt, bbl.	lb.	.20 - .22
Anthracene, 80% drums.	lb.	.70 - .75
Anthraquinone, 25% drums.	lb.	.65 - .70
Benzaldehyde U.S.P., tech., drums.	lb.	.69 - .71
Benzene, pure, tanks, works.	gal.	.25 - .
Benzene, 90% tanks, works.	gal.	.23 - .
Benzidine base, bbl.	lb.	.78 - .80
Benzyl chloride, ref. carboys.	lb.	.35 - .
Benzyl chloride, tech., drums.	lb.	.25 - .
Beta-naphthol, tech., bbl.	lb.	.24 - .25
Beta-naphthylamine, tech.	lb.	.65 - .70
Cresylic acid, 97% drums.	gal.	.62 - .64
95-97% drums.	gal.	.57 - .59
Dichlorobenzene, drums.	lb.	.07 - .08
Dinitrobenzene, bbl.	lb.	.15 - .17
Dinitrochlorobenzene, bbl.	lb.	.20 - .21
Dinitrophenol, bbl.	lb.	.35 - .40
Dinitrotoluene, bbl.	lb.	.18 - .20
Dip oil, 25% drums.	gal.	.26 - .28
H-acid, bbl.	lb.	.70 - .74
Meta-phenylenediamine, bbl.	lb.	.90 - .95
Monochlorobenzene, drums.	lb.	.08 - .10
Naphthalene, flake, bbl.	lb.	.05 - .05
Naphthionate of soda, bbl.	lb.	.60 - .65
Naphthionic acid, crude, bbl.	lb.	.62 - .63
Nitrobenzene, drums.	lb.	.09 - .09
Nitro-naphthalene, bbl.	lb.	.25 - .27
Nitro-toluene, drums.	lb.	.13 - .14
N-W acid, bbl.	lb.	1.10 - 1.15
Ortho-amidophenol, kegs.	lb.	2.40 - 2.50
Ortho-dichlorobenzene, drums.	lb.	.10 - .11
Ortho-toluidine, bbl.	lb.	.14 - .15
Para-aminophenol, base, kegs.	lb.	1.15 - 1.20
Para-dichlorobenzene, bbl.	lb.	.17 - .20
Para-nitraniline, bbl.	lb.	.68 - .69
Para-nitrotoluene, bbl.	lb.	.40 - .42
Para-phenylenediamine, bbl.	lb.	1.30 - 1.35
Para-toluidine, bbl.	lb.	.75 - .80
Phenol, U.S.P., dr.	lb.	.24 - .26
Picric acid, bbl.	lb.	.20 - .22
Pitch, tanks, works.	ton	27.00 - 30.00
Pyridine, imp., drums.	gal.	3.90 - 4.10
Resorcinol, tech., kegs.	lb.	1.30 - 1.40
Resorcinol, pure, kegs.	lb.	2.00 - 2.25
R-salt, bbl.	lb.	.50 - .55
Salicylic acid, tech., bbl.	lb.	.32 - .33
Salicylic acid, U.S.P., bbl.	lb.	.35 - .
Solvent naphtha, water-white, tanks.	gal.	.24 - .25
Crude, tanks.	gal.	.21 - .22
Sulphanilic acid, crude, bbl.	lb.	.16 - .18
Tolidine, bbl.	lb.	1.00 - 1.05
Toluidine, mixed, kegs.	lb.	.30 - .35
Toluene, tank cars, works.	gal.	.26 - .
Toluene, drums, works.	gal.	.31 - .
Xylidine, drums.	lb.	.40 - .42
Xylene, 5 deg.-tanks.	gal.	.38 - .40
Xylene, com., tanks.	gal.	.25 - .27

Naval Stores

Rosin B-D, bbl.	280 lb.	\$7.60 - \$7.70
Rosin E-I, bbl.	280 lb.	7.65 - 7.75
Rosin K-N, bbl.	280 lb.	7.70 - 7.75
Rosin W.G.-W.W., bbl.	280 lb.	8.50 - 9.00
Turpentine, spirits of, bbl.	gal.	.85 - .86
Wood, steam dist., bbl.	gal.	.80 - .82
Wood, dest. dist., bbl.	gal.	.68 - .70
Pine tar pitch, bbl.	200 lb.	5.50 - .
Tar, kiln burned, bbl.	500 lb.	11.50 - 12.00
Rosin oil, first run, bbl.	gal.	.45 - .
Pine tar oil, com'l., bbl.	gal.	.30 - .

Animal Oils and Fats

Degras, bbl.	lb.	\$0.03	\$0.05
Grease, yellow, loose.	lb.	.09	.09
Lard oil, Extra No. 1, bbl.	gal.	.96	.98
Lard compound, bbl.	lb.	.13	.13
Neatsfoot oil, 20 deg. bbl.	gal.	1.42	
Oleo Stearine.	lb.	.11	
Oleo oil, No. 1, bbl.	lb.	.20	.20
Red oil, distilled, d.p. bbl.	lb.	.11	.11
Tallow, extra, loose works.	lb.	.10	
Tallow oil, acidless, bbl.	gal.	.92	.94

Vegetable Oils

Castor oil, No. 3, bbl.	lb.	\$0.17	\$0.17
Castor oil, No. 1, bbl.	lb.	.17	.17
Chinawood oil, bbl.	lb.	.16	
Cocoon oil, Ceylon, bbl.	lb.	.11	.11
Ceylon, tanks, N. Y.	lb.	.10	
Corn oil, crude, bbl.	lb.	.11	.11
Crude, tanks, (f.o.b. mill).	lb.	.10	
Cottonseed oil, crude (f.o.b. mill), tanks.	lb.	.08	.09
Summer yellow, bbl.	lb.	.11	.11
Linseed oil, raw, car lots, bbl.	gal.	1.10	1.11
Raw, tank cars (dom.)	gal.	1.04	1.05
Bleed, cars, bbl. (dom.)	gal.	1.12	1.13
Olive oil, denatured, bbl.	gal.	1.18	1.22
Sulphur, (foots) bbl.	lb.	.09	
Palm, Lagos, casks.	lb.	.09	.09
Niger, casks.	lb.	.08	.08
Palm kernel, bbl.	lb.	.10	.10
Peanut oil, crude, tanks (mill)	lb.	.11	
Refined, bbl.	lb.	.16	.16
Perilla, bbl.	lb.	.14	.14
Rapeseed oil, refined, bbl.	gal.	.98	1.01
Sesame, bbl.	lb.	.14	.14
Soya bean (Manchurian), bbl.	lb.	.12	.13
Tank, f.o.b. Pacific Coast.	lb.	.11	

Fish Oils

Cod, Newfoundland, bbl.	gal.	\$0.64	\$0.66
Menhaden, light pressed, bbl.	gal.	.70	.72
White bleached, bbl.	gal.	.72	.74
Crude, tanks (f.o.b. factory)	gal.	.55	.58
Whale No. 1 crude, tanks, coast.	lb.		
Winter, natural, bbl.	gal.	.75	.76
Winter, bleached, bbl.	gal.	.78	.79

Dye & Tanning Materials

Albumen, blood, bbl.	lb.	\$0.50	\$0.55
Albumen, egg, tech, kegs.	lb.	.95	.97
Cochineal, bags.	lb.	.33	.35
Cutch, Borneo, bales.	lb.	.04	.04
Rangoon, bales.	lb.	.13	.14
Dextrine, corn, bags.	100 lb.	4.52	4.79
Gum, bags.	100 lb.	4.82	5.09
Divi-divi, bags.	ton	42.00	43.00
Fustic, sticks.	ton	30.00	35.00
Chips, bags.	lb.	.04	.05
Gambier com., bags.	lb.	.18	.18
Logwood, sticks.	ton	25.00	26.00
Chips, bags.	lb.	.02	.03
Sumac, leaves, Sicily, bags.	ton	145.00	155.00
Domestic, bags.	ton	50.00	55.00
Starch, corn, bags.	100 lb.	3.87	4.14

Extracts

Archil, conc., bbl.	lb.	\$0.16	\$0.19
Chestnut, 25% tannin, tanks.	lb.	.01	.02
Divi-divi, 25% tannin, bbl.	lb.	.05	.05
Fustic, liquid, 42%, bbl.	lb.	.08	.09
Gambier, liq., 25% tannin, bbl.	lb.	.11	.11
Hematin, crys., bbl.	lb.	.14	.18
Hemlock, 25% tannin, bbl.	lb.	.03	.04
Hypenic, liquid, 51%, bbl.	lb.	.12	.13
Logwood, crys., bbl.	lb.	.14	.15
Liq., 51%, bbl.	lb.	.07	.08
Osage Orange, 51%, liquid, bbl.	lb.	.07	.08
Quebracho, solid, 65% tannin, bbl.	lb.	.04	.04
Sumac, dom., 51%, bbl.	lb.	.06	.06

Dry Colors

Blacks-Carbongas, bags, f.o.b. works, contract.	lb.	\$0.09	\$0.11
Spot, cases.	lb.	.12	.16
Lampblack, bbl.	ton	35.00	45.00
Blue-Prussian, bbl.	lb.	.36	.37
Ultramarine, bbl.	lb.	.07	.35
Browns, Sienna, Ital., bbl.	lb.	.05	.12
Sienna, Domestic, bbl.	lb.	.03	.03
Umber, Turkey, bbl.	lb.	.04	.04
Greens-Chrome, C.P. Light, bbl.	lb.	.28	.30
Chrome, commercial, bbl.	lb.	.10	.11
Paris, bulk.	lb.	.24	.26
Reds, Carmine No. 40, tins.	lb.	4.25	4.50
Iron oxide red, casks.	lb.	.08	.12
Para toner, kgs.	lb.	.95	1.05
Vermilion, English, bbl.	lb.	1.25	1.30
Yellow, Chrome, C.P. bbls.	lb.	.17	.17
Ocher, French, casks.	lb.	.02	.03

Waxes

Beeswax, crude, Afr. bg.	lb.	\$0.31	\$0.31
Refined, light, bags.	lb.	.34	.35
Candelilla, bags.	lb.	.28	.28
Carnauba, No. 1, bags.	lb.	.36	.37
No. 2, North Country, bags.	lb.	.27	.28
No. 3, North Country, bags.	lb.	.24	.25

Japan, cases.	lb.	\$0.15	\$0.16
Montan, crude, bags.	lb.	.06	.06
Paraffine, crude, match, 105-110 m.p., bbl.	lb.	.06	.06
Crude, scale 124-126 m.p. bags.	lb.	.05	
Ref., 118-120 m.p. bags.	lb.	.05	.06
Ref., 123-125 m.p. bags.	lb.	.06	.06
Stearic acid, agle. pressed, bags.	lb.	.11	.11
Double pressed, bags.	lb.	.11	.12

Fertilizers

Acid phosphate, 16% wks.	ton	\$7.50	\$7.75
Ammonium sulphate, bulk f.o.b. works.	100 lb.	2.65	2.70
Blood, dried, bulk.	unit	3.85	3.95
Bone, raw, 3 and 50, ground.	ton	26.00	28.00
Fish scrap, dom., dried, wks.	unit	4.75	
Nitrate of soda, bags.	100 lb.	2.42	
Tankage, high grade, f.o.b. Chicago.	unit	3.00	3.25
Phosphate rock, f.o.b. mines			
Florida pebble, 68-72%.	ton	3.00	3.50
Tennessee, 75%.	ton	6.50	6.75
Potassium muriate, 80%, bags	ton	34.55	
Sulphate, bags, 90%.	ton	45.85	
Double manure salt, bags.	ton	26.35	
Kainit, 14%, bags.	ton	10.25	

Crude Rubber

Para-Upriver fine.	lb.	\$0.34	0.34
Upriver coarse.	lb.	.23	.24
Plantation-First latex crepe	lb.	.34	.34
Ribbed smoked sheets	lb.	.34	

Gums

Copal, Congo, amber, bags.	lb.	\$0.08	\$0.10
East Indian, bold, bags.	lb.	.13	.14
Manila, amber, bags.	lb.	.14	.16
Damar, Batavia, cases.	lb.	.26	.27
Singapore, No. 1, cases.	lb.	.29	.29
Singapore, No. 2, cases.	lb.	.20	.21
Kauri, No. 1, cases.	lb.	.58	.64
Ordinary chips, cases.	lb.	.21	.22
Manjak, Barbados, bags.	lb.	.06	.12

Shellac

Shellac, orange fine, bags.	lb.	\$0.66	\$0.67
Orange superfine, bags.	lb.	.68	.69
Bleached, bonedry.	lb.	.73	.74
T. N., bags.	lb.	.64	.65

Miscellaneous Materials

Asbestos, crude No. 1 f.o.b., Quebec.	sh. ton	\$300.00	\$350.00
Shingle, f.o.b., Quebec.	sh. ton	50.00	60.00
Cement, f.o.b., Quebec.	sh. ton	15.00	20.00
Barytes, grd., white, f.o.b. mills, bbl.	net ton	17.00	17.50
Grd., off-color, f.o.b., Balt net ton	13.00	14.00	
Floated, f.o.b., St. Louis, bbl.	net ton	23.00	24.00
Crude f.o.b. mines, bulk net ton	8.50	9.00	
Casein, bbl., tech.	lb.	.11	.12
China clay (kaolin) crude, No. 1, f.o.b. Ga.	net ton	7.00	8.00
Powd., f.o.b. Ga.	net ton	12.00	16.00
Crude, f.o.b. Va.	net ton	6.00	8.00
Ground, f.o.b. Va.	net ton	10.00	20.00
Imp., powd.	net ton	45.00	50.00
Feldspar, No. 1 f.o.b. N.C. long ton	6.50	7.25	
No. 2 f.o.b. N.C.	long ton	4.50	5.00
No. 1 gr'd. Me.	long ton	19.00	20.00
No. 1 Can., f.o.b., mill, powd.	long ton	25.00	
Graphite, Ceylon, lump, first quality, bbl.	lb.	.05	.06
High grade amorphous crude.	ton	15.00	35.00
Gum arabic, amber, sorts, bags.	lb.	.12	.12
Tragacanth, sorts, bags.	lb.	.50	.55
No. 1, bags.	lb.	1.20	
Kieselguhr, f.o.b. Cal.	ton	40.00	42.00
F.o.b. N.Y.	ton	50.00	55.00
Magnesite, calcined.	ton	35.00	42.50
Pumice stone, imp., casks.	lb.	.03	.40
Dom., lump, bbl.	lb.	.06	.08
Dom., ground, bbl.	lb.	.03	.05
Silica, glass sand, f.o.b. Ind.	ton	2.00	2.25
Sand blast, f.o.b. Ind.	ton	2.25	3.50
Amorphous, 200-mesh, f.o.b. Ill.	ton	20.00	
Glass sand, f.o.b. Ill.	ton	2.00	2.25
Soapstone, coarse, f.o.b., Vt., bags.	ton	7.50	8.00
Talc, 200 mesh, f.o.b., Vt., bags, extra.	ton	10.50	
200 mesh, f.o.b., Ga.	ton	9.50	10.00
325 mesh, f.o.b. New York, grade A.	ton	14.75	

Mineral Oils

Crude, at Wells			
Pennsylvania.	bbl.	\$2.75	\$2.85
Corning.	bbl.	1.50	
Cabell.	bbl.	1.45	
Somerset.	bbl.	1.55	
Illinois.	bbl.	1.37	
Indiana.	bbl.	1.38	
Kansas and Okla. under 28 deg.	bbl.	.75	.85
California, 35 deg. and up.	bbl.	1.40	

Gasoline, Etc.

Motor gasoline steel bbls.	gal.	\$0.15	
Naphtha, V. M. & P. dead, steel bbls.	gal.	.14	
Kerosene, ref. tank wagon	gal.	.13	
Bulk, W.W. delivered, N.Y.	gal.	.08	
Lubricating oils:			
Cylinder, Penn., filtered.	gal.	.33	\$0.36
Bloomless, 30/31 grav.	gal.	.24	
Paraffin, pale 885 vis.	gal.	.15	.16
Sprinkle, 200, pale.	gal.	.21	.21
Petrolatum, amber, bbls.	lb.	.04	.04
Paraffine wax (see waxes)			

Refractories

Bauxite brick, 56% Al ₂ O ₃ , f.o.b. Pittsburgh.	1,000	\$140-\$145	
Chrome brick, f.o.b. Eastern shipping points.	ton	45-47	
Chrome cement, 40-50% Cr ₂ O ₃ , 40-45% Cr ₂ O ₃ , sacks, f.o.b. Eastern shipping points.	ton	23-27	
Fireclay brick, 1st. quality, 9-in. shapes, f.o.b. Ky. wks.	1,000	40-43	
2nd. quality, 9-in. shapes, f.o.b. wks.	1,000	33-37	
Magnesite brick, 9-in. straight (f.o.b. wks).	ton	65-68	
9-in. arches, wedges and keys.	ton	80-85	
Silica brick, 9-in. sizes, f.o.b. Chicago district.	1,000	48-50	
9-in. sizes, f.o.b., Birmingham.	1,000	48-50	
F.o.b. Mt. Union, Pa.	1,000	33-35	
Silicon carbide refract brick, 9-in.	1,000	1,180.00	

Ferro-Alloys

Ferrotitanium, 15-18% f.o.b. Niagara Falls.	ton	\$200.00	
Ferr-chromium, per lb. of Cr, 1-2% C.	lb.	.30	
4-6% C.	lb.	.10	.11
Ferromanganese, 78-82% Mn, Atlantic seab.	gr. ton	105.00	
duty paid.	gr. ton	33.00	35.00
Spiegeleisen, 19-21% Mn.	gr. ton	1.80	2.00
Ferromolybdenum, 50-60% Mo, per lb. Mo.	lb.	39.50	43.50
Ferrosilicon, 10-12% 50%.	gr. ton	72.00	75.00
Ferrotungsten, 70-80% per lb. of W.	lb.	.88	.90
Ferro-uranium, 35-50% of U, per lb. of U.	lb.	4.50	
Ferrovanadium, 30-40% per lb. of V.	lb.	3.50	4.00

Ores and Mineral Products

Bauxite, dom. crushed, dried, f.o.b. shipping points.	ton	\$5.50	\$8.75
Chrome ore, Calif. concentrates, 50% min. Cr ₂ O ₃ .	ton	22.00	
C.i.f. Atlantic seaboard.	ton	18.50	24.00
Coke, fdry., f.o.b. ovens.	ton	4.00	4.50
Coke, furnace, f.o.b. ovens.	ton	3.00	3.10
Fluorspar, gravel, f.o.b. mines, Illinois.	ton	17.50	18.50
Ilmenite, 52% TiO ₂ , Va.	lb.	.01	
Manganese ore, 50% Mn, c.i.f. Atlantic seaport.	unit	.39	.41
Manganese ore, chemical (MnO ₂).	ton	75.00	80.00
Molybdenite 85% MoS ₂ , per lb. Mo S ₂ , N. Y.	lb.	.70	.75
Monazite, per unit of ThO ₂ , c.i.f., Atl. seaport.	lb.	.06	.08
Pyrites, Span., fines, c.i.f. Atl. seaport.	unit	.11	.12
Pyrites, Span., furnace size, c.i.f. Atl. seaport.	unit	.12	
Pyrites, dom. fines, f.o.b. mines, Ga.	unit	.12	
Rutile, 94@96% TiO ₂ .	lb.	.12	.15
Tungsten ore, scheelite, 60% WO ₃ and over.	unit	9.00	
Tungsten, wolframite, white, 60% WO ₃ .	unit	8.50	8.75
Uranium ore (carnotite) per lb. of U ₃ O ₈ .	lb.	3.50	3.75
Uranium oxide, 96% per lb. U ₃ O ₈ .	lb.	12.25	12.50
Vanadium pentoxide, 76%.	lb.	3.00	3.25
Vanadium ore, per lb. V ₂ O ₅ .	lb.	1.00	1.25
Zircon, 99%.	lb.	.06	.07

Non-Ferrous Metals

Copper, electrolytic.	lb.	\$0.13	\$0.14
Aluminum, 98 to 99%.	lb.	.27	.28
Antimony, wholesale, Chinese and Japanese.	lb.	.15	
Nickel, 99%.	lb.	.29	.33
Monel metal.	lb.	.32	
Tin, 5-ton lots, Straits.	lb.	.54	
Lead, New York, spot.	lb.	.0865	
Zinc, spot, New York.	lb.	.0715	
Silver (commercial).	oz.	.68	
Cadmium.	lb.	.60	.62
Bismuth (508 lb. lots).	lb.	1.50	1.55
Cobalt.	lb.	2.50	3.00
Magnesium, ingots, 99%.	lb.	.90	.95
Platinum, refined.	oz.	118.00	
Mercury.	75 lb.	68.00	69.00
Tungsten powder.	lb.	.95	1.00

Industrial Developments of the Week

New Construction and Machinery Requirements in the Process Industries

Some Opportunities This Week

Acetylene GasFt. Worth, Tex.
AsbestosBluefield, Va.
CanneryLos Angeles, Calif.
CementDawson, Okla.
Cement and Lime.....New Orleans, La.
ChemistryFayetteville, Ark.
LaboratoryPalo Alto, Calif.
PaintsSan Francisco, Calif.
PaperWindsor, N. S.
PaperIroquois Falls, Ont.
PotteryZanesville, Ohio
RubberPiedmont, N. C.
RubberChattanooga, Tenn.
Sugar Refinery....East Grand Forks, Minn.

New England

Mass., Woburn—Woburn Degreasing Co., E. O. Rouke, Pres., awarded the contract for the construction of a 1 story, 100 x 55 ft. plant at Willow and Burlingame Sts., to D. H. Walker Co., 10 Fletcher St., Lowell. Estimated cost \$100,000 with equipment.

South

Fla., Bartow—M. Myers, Los Angeles, Calif., plans the construction of a soap manufacturing plant at corner of 7th Ave. and 36th St.

Fla., Jacksonville—Bo-Kay Perfume Co., 732 Forest St., W. R. Sargent, Vice. Pres., plans the construction of a 2 story, 60 x 90 ft. building for the manufacture of toilet goods. R. A. Benjamin, Bisbee Bldg., is architect.

La., New Orleans—The Phoenix Portland Cement Co., Nazareth, Pa., L. C. Morton, Pres., has completed plans for the construction of a plant for the manufacture of Portland cement by the wet process, also chemical and hydrated lime, on a 15 acre site on the Industrial Canal. The first unit will have a daily capacity of 2,500 bbl. of Portland cement and 1,000 bbl. of lime, initial cost approximately \$2,000,000. The capacity of the plant will be doubled as soon as conditions warrant it. Work will be done by company forces under the supervision of R. J. Hawn, chief engineer.

N. C., High Point—Piedmont Rubber Co., Inc., D. L. Butler, Pres.-Gen. Mgr., Box 709, awarded the contract for the construction of 35 x 125 ft. building, first unit, to A. S. Newton, High Point.

Tenn., Chattanooga—Crane Enamelware Co., 14th and Chestnut Sts., will soon award contract for the construction of a 192 x 200 ft. warehouse, estimated cost \$50,000 to \$75,000.

Tenn., Chattanooga—Moore-Meritt Co., incorporated with T. L. Moore, Pres., R. A. Barber, Secy., capital \$300,000, has acquired a plant at Alton Park and will manufacture rubber mechanical specialties.

Tenn., Knoxville—Indian Refining Co., Oak St. Bridge, W. A. Fowler, Local Mgr., plans to rebuild plant recently destroyed by fire.

Va., Bluefield—Twin City Product Co., plans the construction of a plant on Sargent St., for the manufacture of elastic asbestos liquid roofing cement.

Middle West

O., Fostoria—National Carbon Co., A. V. Wiltser, Gen. Supt., West 117th St. and Madison Ave., Cleveland, awarded the contract for the construction of a 1 story, 65 x 170 ft. factory, estimated cost \$40,000. Private plans.

O., Zanesville—S. A. Weller Pottery Co., is having plans prepared for a 3 story,

This page is of value not only as a machinery market but also as an index of the general activity and growth of the industries served by Chem. & Met. The reports are gathered by our regular correspondents who are instructed to verify every detail. Requirements for new machinery will be published here free of charge.

335 x 53 ft. addition to factory, also a Harrop tunnel kiln, estimated cost \$165,000. Private plans.

West of Mississippi

Ark., Fayetteville—University of Arkansas, c/o J. C. Futrell, Pres., is having preliminary plans prepared for the construction of a group of buildings including a chemistry building estimated cost \$1,500,000. Private plans.

Minn., East Grand Forks—Red River Sugar Co., H. A. Douglas, Pres., 412 Oak Grove St., Minneapolis, has awarded the contract for a storage warehouse, capacity 12,000,000 to 15,000,000 lb., to Thorvaldson & Johnson, Grand Forks, about \$35,000. Contract for foundation for the main building of the sugar manufacturing plant will be awarded about Dec. 1st; bids on the 3 story superstructure will not be taken until after Jan. 15, 1925; cost approximately \$200,000; several other buildings will be built late in the season. Machinery equipment for beet sugar manufacturing, also chemical equipment has not been purchased. A. Schoen, Detroit, Mich., is engineer.

Ill., Aurora—Beth Chemical Corp., New York City, having preliminary plans prepared for the construction of a chemical plant. Private plans. T. H. Loy, Secy. Chamber of Commerce, Aurora, interested.

Okla., Dawson—C. S. Avery & Associates Cement Co., Tulsa, will soon receive bids for the construction of a cement plant, estimated cost \$1,000,000. Private plans.

Tex., Fort Worth—Texas Acetylene Co., recently incorporated by W. B. Paddock and C. K. Rickel, 2814 Mevith Ave., Arlington Heights, plans the construction of a plant with capacity output of 400,000 cu.ft. of gas per month, estimated cost \$70,000.

Far West

Calif., Los Angeles—Shauer Bros., New York and Chicago, Ill., c/o I. W. Wolfe, 1331 West 71st St., Los Angeles, representative of Pacific Coast Dist., is having plans prepared for the construction of a canning plant on 39th St. Estimated cost \$350,000.

Calif., Palo Alto—Leland Stanford University, is having preliminary plans prepared for the construction of an experimental laboratory. Bakewell & Brown, 251 Kearny St., San Francisco, are architects.

Calif., San Francisco—Magner Bros., 114 9th St., paint manufacturers, plan the construction of a 4 story paint factory at Jerrold and Napoleon Aves., estimated cost \$200,000. Architect not selected.

Canada

B. C., New Westminster—Whalen Pulp & Paper Mills, plans the construction of a newsprint mill.

N. S., Windsor—Brenton Sexton is in the market for equipment for fruit evaporation.

Ont., Iroquois Falls—Abitibi Pulp & Paper Co., plans an addition to their pulp and newsprint mill, estimated cost \$3,000,000. G. F. Hardy, 309 Broadway, New York City, is consulting engineer. Owner will purchase equipment including paper machines, reels, dryers, grinders, electric motors, etc.

Ont., London—IXL Spice Mills, 19 Mar-mora St., D. Gwalchmai, Gen. Mgr., is rebuilding plant recently destroyed by fire and wants prices on special electrically driven machinery for grinding spices, peanut butter, etc. Estimated cost \$50,000.

Unverified

Ala., Cragford—Southerns Arsenic & Mineral Products Co., of Delaware, Forsyth Bldg., Atlanta, Ga., plans the construction of an arsenic producing plant fully equipped to develop 1,454 acres carrying extensive deposits of arseno-pyrite rock.

Fla., Bradenton—City plans an election Dec. 15, to vote \$200,000 bonds for gas plant and mains. Address W. Curry, mayor.

Ga., Dalton—The Dalton Brick & Tile Co., recently organized by J. C. McFarland, W. J. Loyd and associates, plans the construction of a plant about 3 mi. south of here.

Ga., Rossville—American Cement Paint Co., W. P. D. Moross, Pres., awarded the contract for the construction of first unit of cement paint plant, to Dixie Concrete Products Co., James Bldg., Chattanooga, Tenn. Estimated cost \$60,000.

Ill., La Salle—The Red Star Cement Co., 140 South Dearborn St., Chicago, is having preliminary plans prepared for the construction of a new cement mill to cost approximately \$2,000,000, including equipment.

Mich., Detroit—The Peerless Portland Cement Co., Union City, has filed plans for two more buildings here to be 1 story, 80 x 320 ft., and 82 x 265 ft., respectively, estimated to cost \$240,000.

Incorporations

Durham Paper Mills, Philadelphia, Pa., manufacture, capital \$100,000. (Corp. Guarantee and Trust Co.)

Taunton Oil Cloth Co., Taunton, Mass., oil cloth, artificial leather and coated fabrics; capital \$1,000,000. Incorporators, G. K. Gardner, Hingham and D. H. Worrall and R. H. Duncan of Cambridge.

Highland Park Die Casting Co., manufacturing aluminum, \$100,000; H. D. Rice, D. Sanders, J. Carrier, Detroit, Mich. (Corp. Service Co.)

Broza Mfg. Co., Dover, Del., metal polishes, \$25,000. (Capital Trust Co. of Delaware.)

Chemical Treatment Co., New York City, 5,000 shares preferred stock and 150,000 common; E. Harding, J. T. Pratt, J. D. Sears. (Attorneys, Campbell, Harding & Pratt, 43 Wall St., New York City.)

Certone Co., Wilmington, Del., manufacturing drugs, \$1,000,000; (Colonial Charter Co.)

New Process Plate Glass Co., Dover, Del. manufacture, \$150,000; (Capital Trust Co. of Delaware.)

Diatomaceous Products Co., mine earth and clays, \$300,000; F. B. Matthews, La-Platte, Md., G. H. Stevenson, Bel Alton, Md., W. V. Howard, Washington, D. C., (J. P. Lefever, Dover, Del.)

Tupelo Agricultural Corp., manufacture fertilizers, \$10,000; A. French, F. F. Ward, C. J. Cottee, New York. (U. S. Corp. Co.)

Virginia Cellulose Co., Hopewell, Va., J. O. Heflin, Pres., increasing capital from \$150,000 to \$300,000.

Southern Extract Co., Knoxville, Tenn., increasing capital from \$50,000 to \$300,000.